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Handbook on USSR Military Forces: Chapter IX, Equipment, 15 October 1946

War Department (USA)

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Technical Manual TM 30-430
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Comments

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Abstract

TM 30-340, Handbook on USSR Military Forces, was "published in installments to expedite dissemination to the field." TM30-430, Chapter IX, 15 October 1946, "Equipment," contains detailed descriptions of non-combat vehicles; fire control equipment; individual equipment; and chemical warfare, engineering, medical, and signal equipment. The chapter is illustrated with numerous pictures and diagrams.

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A Note on Scholarly Usage

Since revised editions of Army manuals are customarily issued with the same manual number and title as the previous editions, the minimal scholarly citation must contain the date of issue. The minimum unambiguous citation for this chapter is TM 30-430, Chapter IX,
15 October 1946.

CHAPTER IX

EQUIPMENT

INTRODUCTION

1. GENERAL

When compared to United States and British standards, equipment of the Red Army must be considered inferior in quality and in quantity. In important categories, such as automotive (noncombat vehicles), engineer, signal, and medical, a large proportion of the equipment is of outmoded design and of such a nature as to indicate that these fields never were fully developed prior to World War II. It must not be inferred that the Soviets failed to realize the importance of such items. Instead, they concentrated on the production of arms.

The standard of an army's equipment is a clear reflection of the civilian industry of its country. Nowhere is this more clearly illustrated than in the case of Soviet noncombat vehicles, earth-moving, and constructional equipment, which owe their development and subsequent production to civilian industry rather than to state arsenals.

Herein probably lies the reason for these deficiencies in the Red Army. For it would appear that the U. S. S. R. was unable to develop its industrial capacity sufficiently to provide the essential weapons for the combat forces and, at the same time, to provide the diversity of equipment required by a modern army.

2. LEND-LEASE

To what degree the U. S. S. R. was left free to concentrate on the production of weapons, knowing that a large proportion of its equipment would be provided through Lend-Lease, cannot be stated. However, without the mass of material obtained from this source, the Red Army would have been impeded most seriously in its operations and possibly, because of the inadequacy of its transportation, threatened with collapse. The importance of Lend-Lease assistance is illustrated by the fact that a total of approximately 333,000 1½- and 2½-ton trucks are believed to have been received by the U. S. S. R. from the U. S., in addition to thousands of other vehicles and vast quantities of general equipment.

PART I. NONCOMBAT VEHICLES

Section I. MOTORCYCLES

1. GENERAL

Soviet motorcycles (fig. 1) appear to differ little from those of other nations. The Red Army uses motorcycles for messenger work, traffic control, reconnaissance, and similar tasks. Like the Germans, the Soviets used motorcycles for armed reconnaissance. Machine guns are mounted on the sidecars. Both the driver and the machine gunner are armed with rifles or machine pistols. The Red Army also mounts mortars on motorcycle sidecars.

2. FUTURE TRENDS

The Soviets received 34,000 U. S. motorcycles through Lend-Lease. It is to be expected, therefore, that future Soviet motorcycle designs will include developments of features of standard U. S. models.

3. CHARACTERISTICS

For characteristics and performance of Red Army motorcycles, see figure 1.

Designation	Weight empty (pounds)	Crew	Brake horsepower	Fuel capacity (gallons)	Oil capacity (gallons)	Maximum speed (miles per hour)	Average cruising range
IZ-12 solo	357	1 or 2	13.5	3.27	0.47	67	220
AM-600 with sidecar	732	2	16.5	3.5	.47	43	115
M-72 with sidecar	707	3	22	4.68	.47	68	185

Figure 1. Characteristics of motorcycles.

Section II. WHEELED VEHICLES

1. GENERAL

Experiments, which the Red Army began prior to World War II, materialized in the production of a comparatively wide range of general and special purpose vehicles. All efforts notwithstanding, the Soviets remained backward in this field, and entered World War II seriously deficient in utility vehicles. Three general types, the ZIS (fig. 2), the YAG, and the GAZ (figs. 3 and 4), were in production at the start of World War II. The ZIS and the YAG are

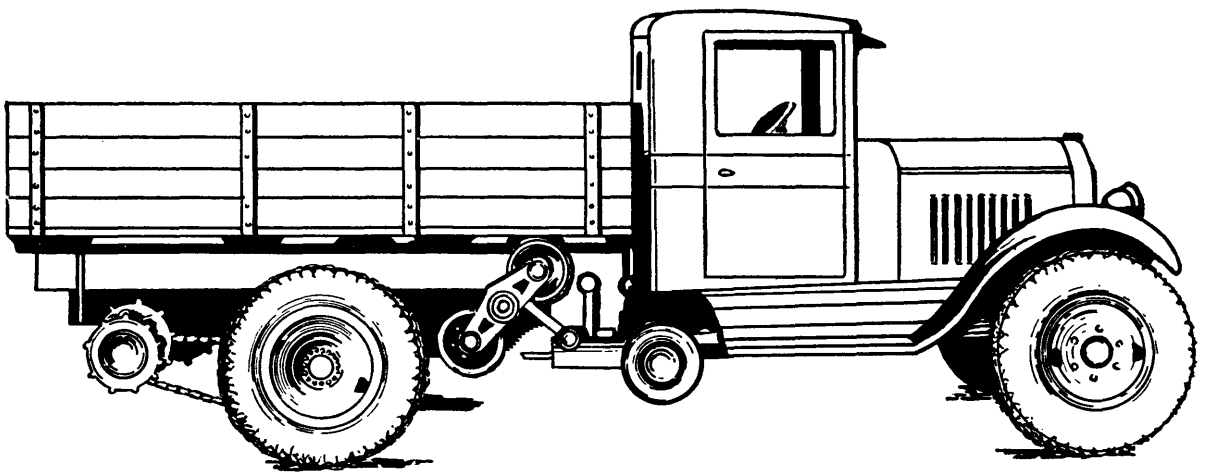

Figure 2. ZIS–5 truck with half-track attachment.

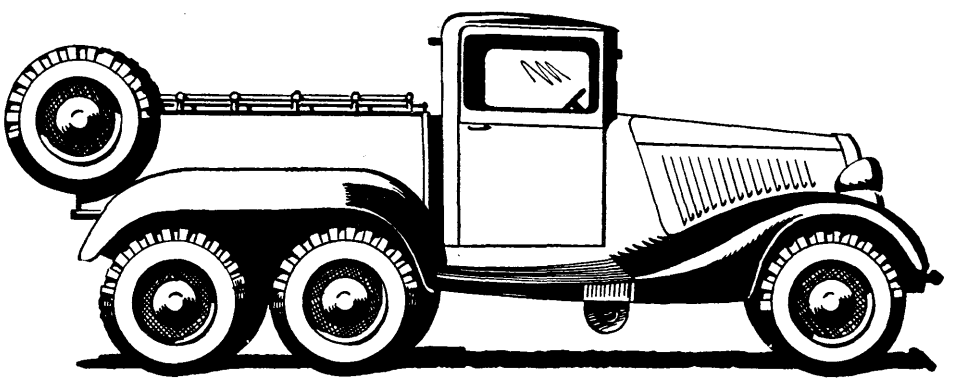

Figure 3. GAZ–21 truck.

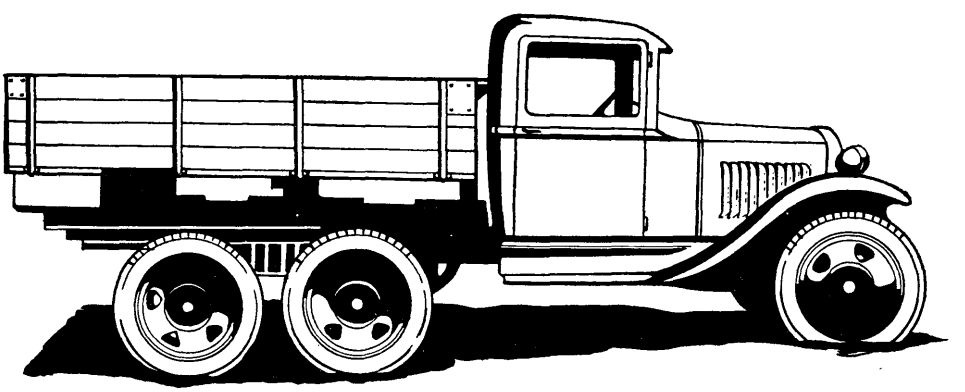

Figure 4. GAZ–AAA truck.

Designation	Weight empty+load =total (tons)	Number axles and number driven	Personnel capacity	Maximum brake horsepower	Fuel capacity main+auxiliary =total (gallons)	Type fuel	Oil capacity (gallons)	Cruising range (miles)		Maximum speed in convoy (miles per hour)	Size of loading space (feet)
								On main supply	On total supply		
GAZ–AA	2+1.66=3.66	2:1	16 to 18	42 to 50	10.5+53=63.5	Gasoline	1.78	119	565	44	7.5 x 5.7.
GAZ–AAA	2.75+2.2=4.95	3:2	16 to 18	50	10.5+42.5=53	do	1.78	81	315	40.5	7.5 x 5.7.
ZIS–5	3.4+3.3=6.7	2:1	24	73	15.9+79=94.9	do	2.65	103	500	37.5	9.4 x 6.3.
ZIS–6	4.65+4.4=9.05	3:2	24	73	28+75=103	do	2.65	150	375	31	9.4 x 6.3.
YAG–6	5.4+5.5=10.9	2:1	30	73	47+	do	2.65	250	....	25	11.3 x 7.7.
YAG–1D	6.0+8.8=14.8	3:2		93		do				25	12.4 x 6.1.
GAZ–M	1.51+	2:1	4 to 5	50	16+	do	1.78	250	....	62.5	
GAZ–64	1.32+.66=1.98	2:2	4	42	10.5+19=29.5	do	1.78	195	375	56.5	
GAZ–61	1.82+.55=2.37	2:2	4 to 5	85	16+29=45	do	2.25	140	438	62.5	

Figure 5. Characteristics of wheeled vehicles.

heavy vehicles, weighing more than 6 tons loaded. The GAZ, considerably lighter, was developed at the Gorky factory from Ford designs. It was produced in considerable numbers. Other GAZ models are powered with Chevrolet engines.

Soviet vehicles are relatively simple in design, but power/weight ratios are quite high in comparison with those of United States manufacture. Engines are designed usually for gasoline of poor quality, with lower compression ratios than those produced in the United States. Because hydraulic brake fluids were unobtainable in the U. S. S. R. during the war years, mechanical brakes are in general use. Shock absorbers are mainly friction types. A few use commercial glycerin, but the number is limited by the shortage of glycerin. Because Soviet vehicles are designed to be operated in cold climates, thin lubricating oils are used. Many precautions must be taken with parked vehicles to prevent freezing.

Approximately 430,000 standard United States Army vehicles were shipped to the U. S. S. R. under Lend-Lease, greatly easing the problems of the Soviets, who had been dependent largely on horse-drawn vehicles for transportation of supplies. In addition to that furnished by the United States, much equipment was furnished by Great Britain.

The following vehicles were received from the United States under Lend-Lease.

Vehicle	Number
Scout Cars, M3A1	3,310
Trucks, ¼- to 1½-ton	229,054
Trucks, 2½-ton	190,686
Trucks, amphibious, 2½-ton	1,118
Trucks, more than 2½-ton	1,383
Trucks, special purpose	3,301
Vehicle—Continued	Number
Trailers, 7-ton	1,950
Trailers, 20-ton	14
Trailers, 22½-ton	196
Tank transporters, 45-ton	531
Vehicles, tank, recovery	130
Total	431,673

2. FUTURE TRENDS

Large quantities of German automotive equipment were captured by the Soviets, and production facilities in that section of Germany now occupied by the Soviets doubtlessly have yielded much information. From this, and the study of United States and British equipment received under Lend-Lease, it is apparent that the Soviets will experience little trouble in the manufacture of well-designed, modern vehicles.

3. CHARACTERISTICS

For characteristics and performance of wheeled vehicle, see figure 5.

Section III. HALF-TRACK VEHICLES

1. GENERAL

The Soviets have not developed the design of half-track vehicles. This may be due mainly to the reliance placed on the United States Weasel and British Universal carrier, full-track vehicles. (See sec. IV.)

Although the Soviets do have half-track vehicles, none have been encountered in action. The only type used on a wide scale is the ZIS–33, a modification of the standard ZIS–5 truck. This is not a half-track in the strict sense of the term, but is merely a truck with a complicated cross-country track attachment.

Because of the reliance the Soviets place on full-

track vehicles, the future of half-track design is uncertain. Approximately 1,160 United States Army half-track vehicles have been received by the Soviets through Lend-Lease. Also, German half-tracks have been captured. Any future developments, therefore, may be expected to incorporate the best features of United States, British, and German equipment.

2. INDIVIDUAL VEHICLES

The following half-track vehicles are known to be in use in the Red Army:

a. VM half-track. The smallest Soviet half-track is the VM, a half-track version of a standard chassis. It is a closed personnel carrier. The suspension system consists of a sprocket drive and front idler, both of similar size and fitted to the

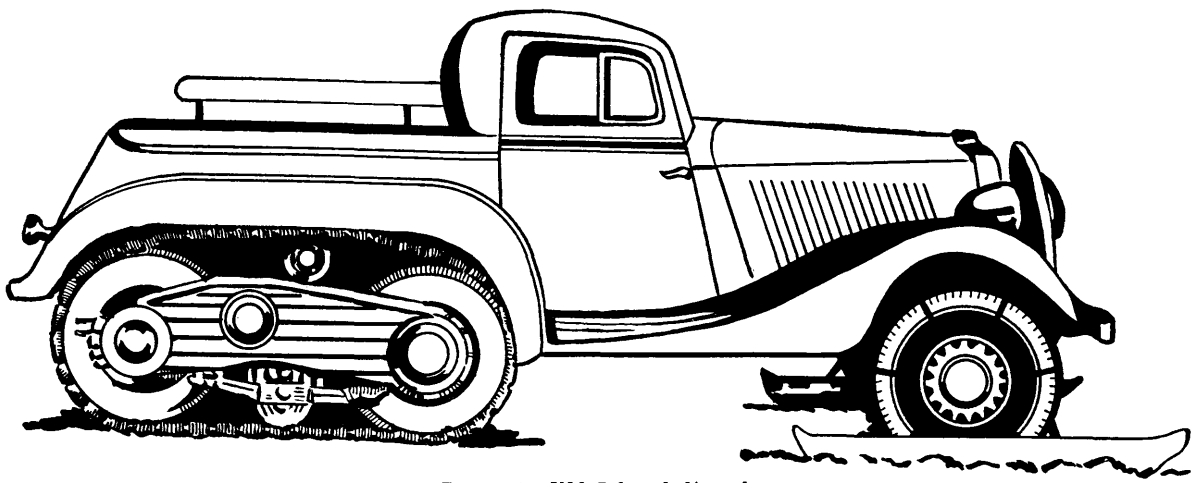

Figure 6. VM Pikap half-track.

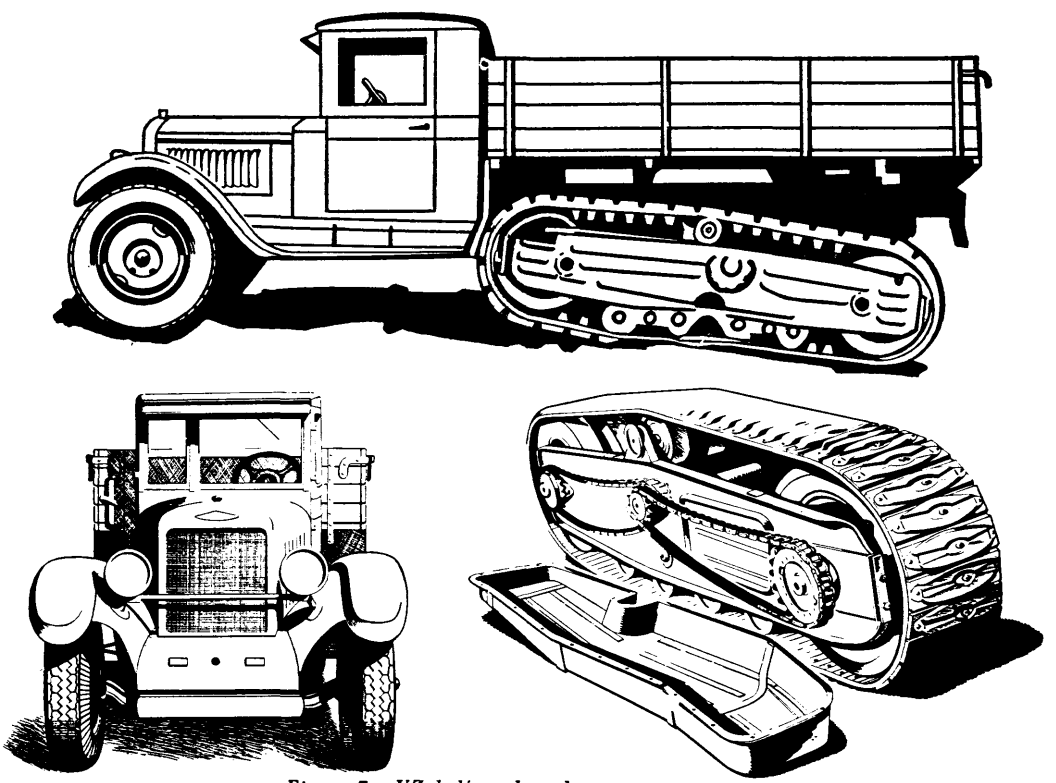

Figure 7. VZ half-track and suspension system.

actually a half-track, is the only vehicle known to be used in normal half-track roles. Although the ZIS–33 uses the same basic chassis as the VZ, it employs an entirely different suspension. The driving sprocket is located at the rear. It is driven by a chain, which is powered by a sprocket located between the dual wheels. Two spring-mounted bogies are located between the driving sprocket and the idler wheel, located below the rear wall of the cab. There are no return rollers, and the slack track rides on top of the tires. Track guides ride between the dual tires.

Section IV. TRACTORS AND FULL-TRACK VEHICLES

1. GENERAL

The Soviet tractors in service at present are quite efficient. Both Diesel and gasoline engines are in use, but gasoline-driven machines appear to be more common, particularly in the lighter types. Three classes of tractors are as follows:

Heavy prime movers (weighing from 11 to 20 tons):
Voroshilovets.
Komintern.
ST–2.
Used to tow medium and heavy artillery. Seats provided for gun crews.

Light prime movers (weighing from 3 to 7 tons):
STZ–3.
STZ–5.
Used to tow light artillery.

Engineer tractors (weighing from 10 to 13 tons):
S–60.
S–65.
Used as bulldozers, angledozers, and for towing engineer equipment. Excellent towing capacity, low speed.

In addition to home-produced tractors, the U. S. S. R. has received 8,664 tractors and prime movers from the United States Army through Lend-Lease.

2. HEAVY PRIME MOVERS

Heavy prime movers are used mainly for towing heavy and medium artillery. A body and driver's cab, similar to those of a normal cargo truck, are fitted. Three or four rows of seats are provided to

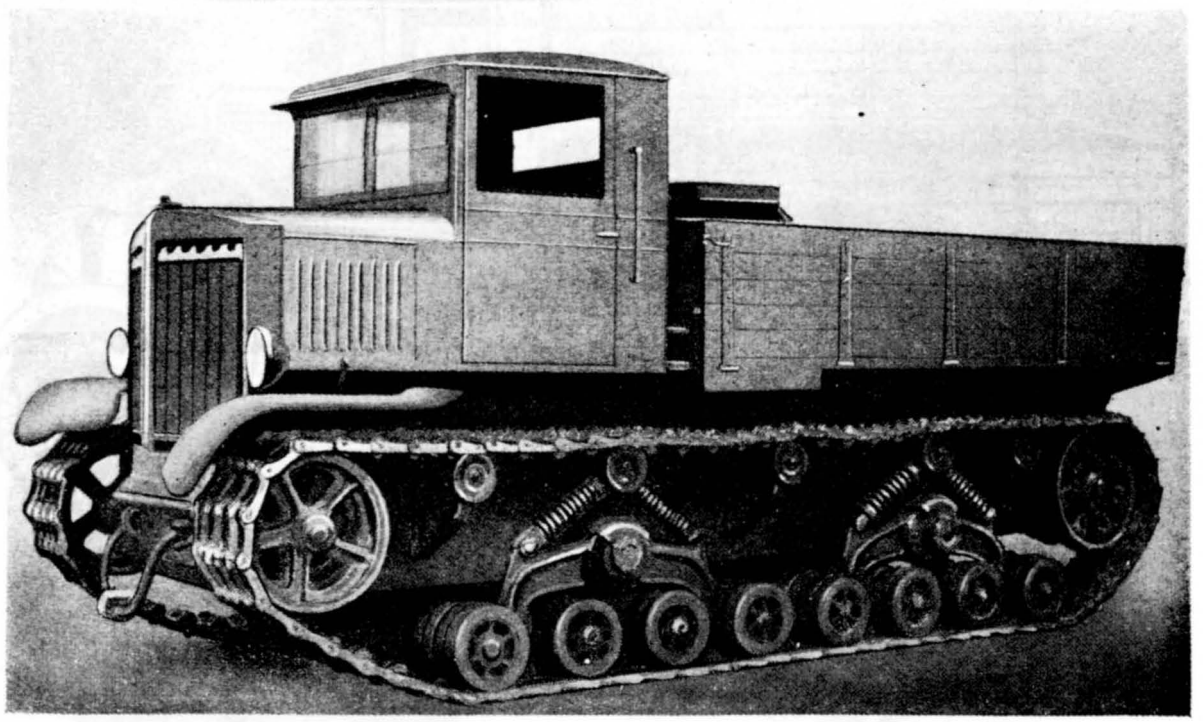

Figure 10. Voroshilovets heavy prime mover.

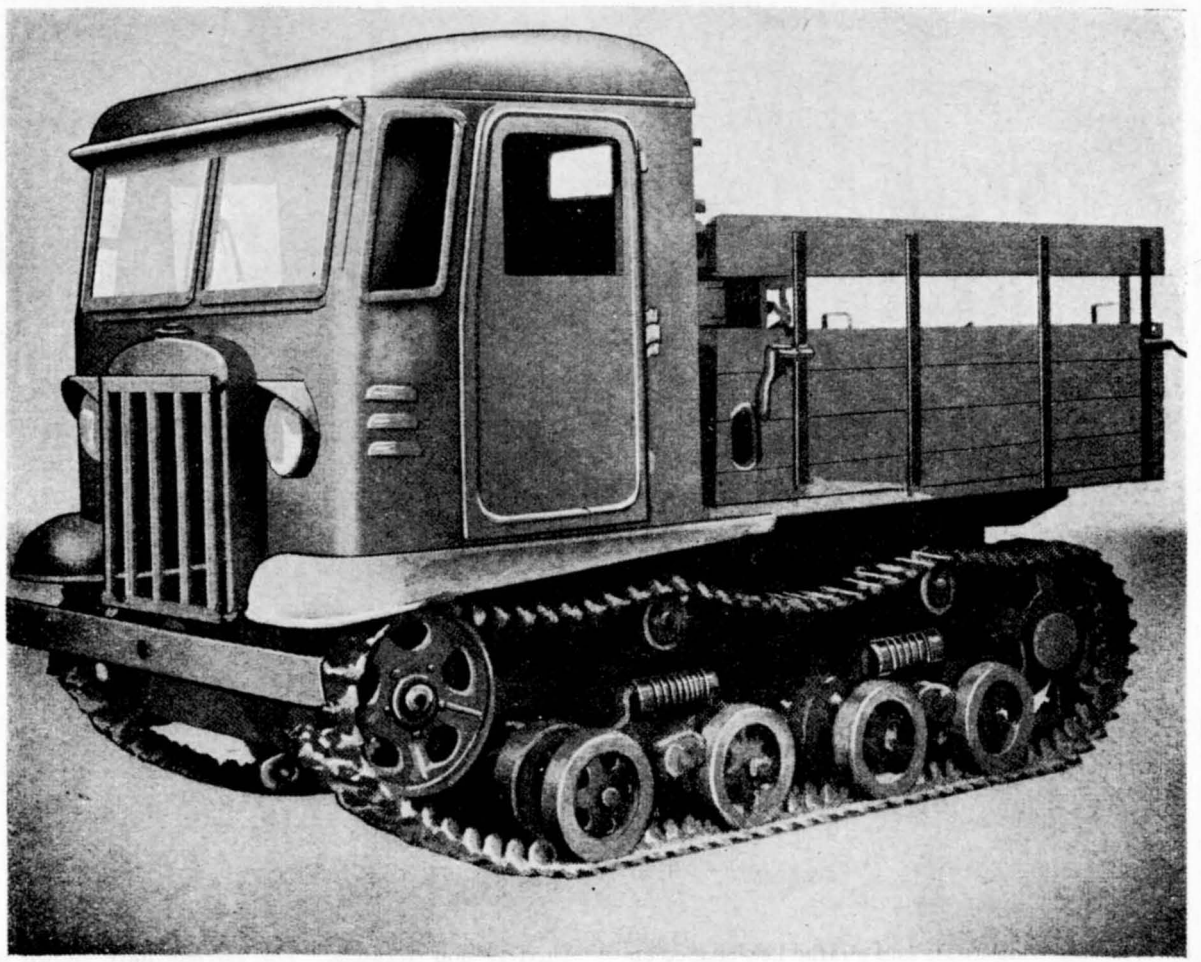

Figure 11. STZ–5 light prime mover.

accommodate the gun crew. Normally, the body is open at the rear, but many tractors with covered personnel accommodations have been encountered. Suspension consists primarily of a rear sprocket and front idler. The heaviest tractor, the Voroshilovets (fig. 10), is powered by the same Diesel engine as the T–34 medium tank. It has two sets of bogies on each side (each set having four wheels) and five return rollers.

The gasoline-powered Komintern has the same arrangement of sprocket and idler, but has four pairs of bogies each side, each pair being fitted to vertical spring mounts. Four return rollers are fitted.

The ST–2, a Diesel-powered model, has two pairs of spring-mounted bogies on each side, a front idler, rear sprocket, and two return rollers.

3. LIGHT PRIME MOVERS

The light class consists of three gasoline-driven tractors weighing from 3 to 7 tons. They are used mainly for towing light artillery on trailers. With the exception of the STZ–3, they have seats for gun crews.

The STZ–3 has two pairs of bogie wheels, a front sprocket, a rear idler, and two return rollers. The superstructure of the STZ–3 tractor is lightly armored. The STZ–5 (fig. 11) has identical suspension, but otherwise has the appearance of a normal load-carrying vehicle.

4. ENGINEER TRACTORS

Only two types of engineer tractors are known to exist, the S–60 (fig. 12) and the S–65 (fig. 13). Both are conventional engineer tractors in appear-

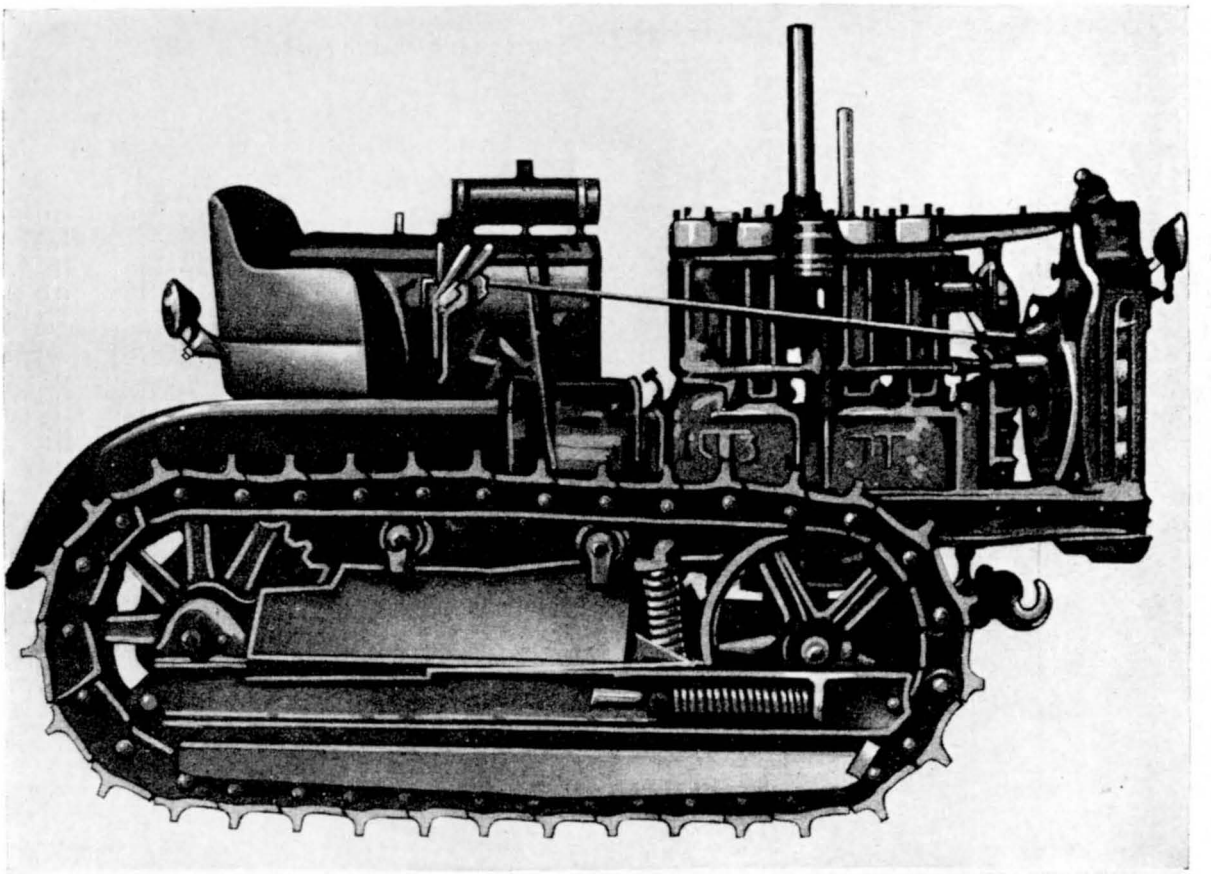

Figure 12. S–60 engineer tractor.

ance, having wide tracks and a large box-shaped engine cover with exhaust protruding vertically. The driver's seat is fitted in a high rear position and is unprotected, although some tractors are fitted with an improvised cab.

The S–60 has a gasoline engine of 60 brake horsepower. Suspension consists of five small bogies, completely enclosed, and a rear sprocket and a forward idler. The idler is fitted with a track tension device. Two return rollers are fitted.

The S–65 tractor is powered by a Diesel engine. A small two-cylinder gasoline engine, connected to the Diesel engine by a clutch, is used for starting. The Diesel engine is rated at 65 brake horsepower. The S–65 appears to be very similar to the S–60; suspension and drive are identical.

5. FULL-TRACK VEHICLES

Included in the lend-lease equipment obtained from Great Britain and the United States are Universal carriers and Weasels. The Soviets have shown a tremendous interest in both of these vehicles, and placed great reliance on them in combat. Future progress in the field of full-track vehicles can be expected to follow closely the lessons learned from these vehicles.

6. CHARACTERISTICS

For characteristics and performance of Soviet heavy, light, and engineer tractors, see figure 14.

Section V. SELF-PROPELLED SLEIGHS

1. GENERAL

The Red Army has developed self-propelled sleighs for use on ice and snow. Several different types are in use, but all operate on the same principle. Three or four skis are mounted on supports, which replace normal axles. Spring shock absorbers and limited universal joints are fitted.

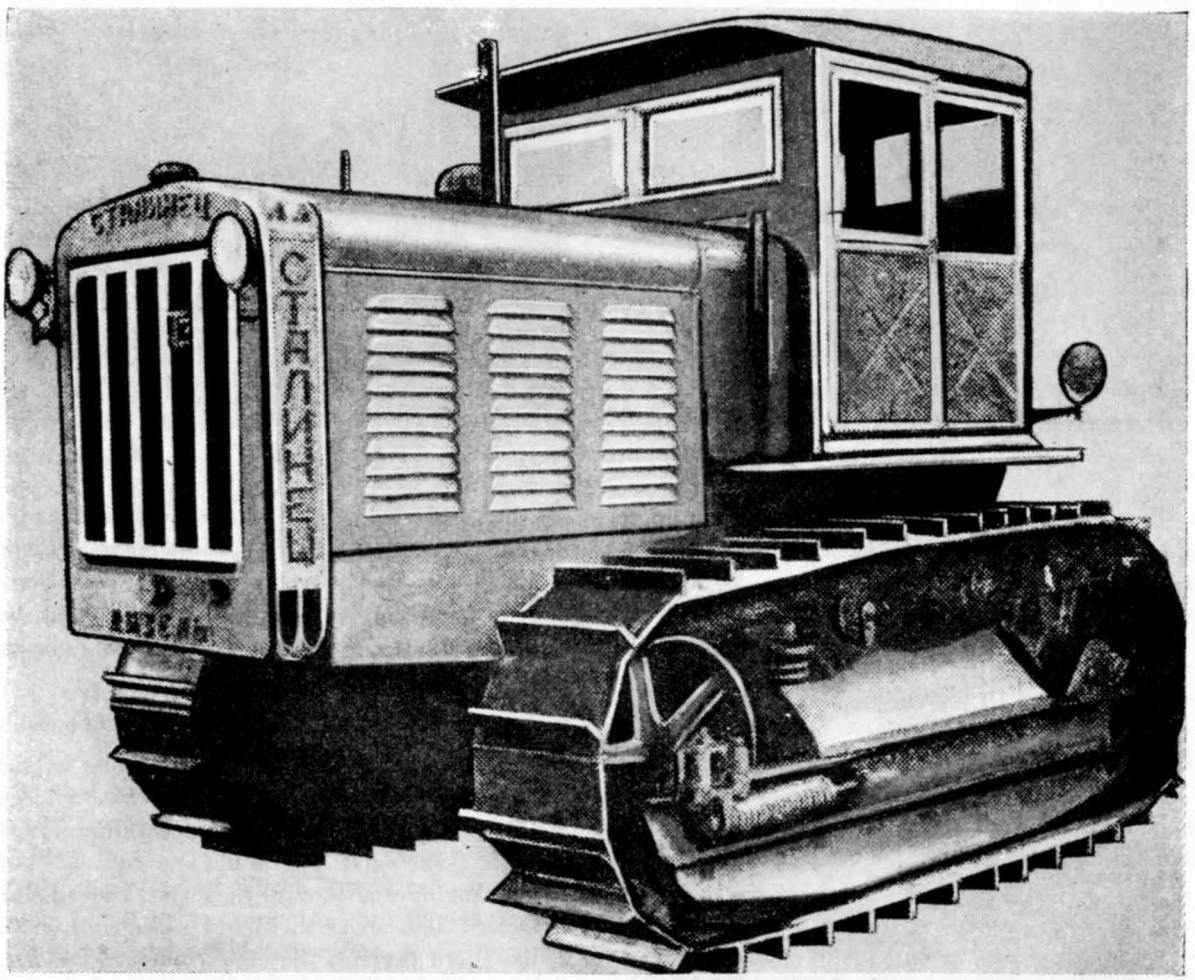

Figure 13. S–65 engineer tractor with cab.

Designation	Weight (tons)	Dimensions (*a*) Length (*b*) Width (*c*) Height (feet)	Clearance (feet)	Fuel	Maximum maintainable speed (miles per hour)	Tractive effort (tons)	Towing capacity	
							Load (tons)	Number trailers
Voroshilovets	20	(*a*) 19.6, (*b*) 7.7, (*c*) 10.1	1.3	Diesel	12.5 to 16	11	39	4 to 5.
ST–2	13.2	(*a*) 14.8, (*b*) 7.5, (*c*) 8.5	1.5	do	7.5 to 9	5.5	11	2 to 3.
Komintern	11.6	(*a*) 18.9, (*b*) 7.6, (*c*) 9.8	1.5	Gas	7.5 to 10	7.4	13	2.
STZ–5	6.6	(*a*) 13.4, (*b*) 5.9, (*c*) 8.5	1.1	do	12.5 to 16	2.75	6.5	1 to 2.
STZ–3	5.6	(*a*) 11.8, (*b*) 5.9, (*c*) 6.6	1.1	do	2.75	2.75	6.5	1 to 2.
Komsomolets (T–10)	4.4	(*a*) 11.1, (*b*) 5.9, (*c*) 6.9	1.0	do	25	1.8	2.75	1 to 2.
S–65	12.6	(*a*) 13.1, (*b*) 7.9, (*c*) 9.3	1.3	Diesel	2.5	4.5	22	3 to 4.
S–60	10.5	(*a*) 13.1, (*b*) 8.3, (*c*) 6.8	1.3	Gas	2.25 to 5	4.9	22	3 to 4.

Designation	Personnel capacity	Crew	Maximum brake horsepower	Maximum range		Fuel capacity (gallons)	Oil capacity (gallons)	Maximum gradient (degrees)	Fording depth (feet)
				Solo (miles)	Towing (miles)				
Voroshilovets	15	3	400	188 to 234	156 to 187	129	1.43	26	2.62
ST–2	8	2	105–110	56 to 75	44 to 56	58	5.15	28	3.28
Komintern	12	2	130	100 to 144	81 to 100	129	6.8	30	2.3
STZ–5	8	2	52		44 to 75	38	4.2	30	2.45
STZ–3		2	52	31 to 50	25 to 38	47	4.2	30	2.0
Komsomolets (T–10)	6	2	40	156	94 to 106	28	1.1		1.64
S–65		2	65	56 to 94		80	5.15	30	2.0
S–60		2	60	50 to 81		100	4.4	30	2.0

Figure 14. Characteristics and performance of tractors.

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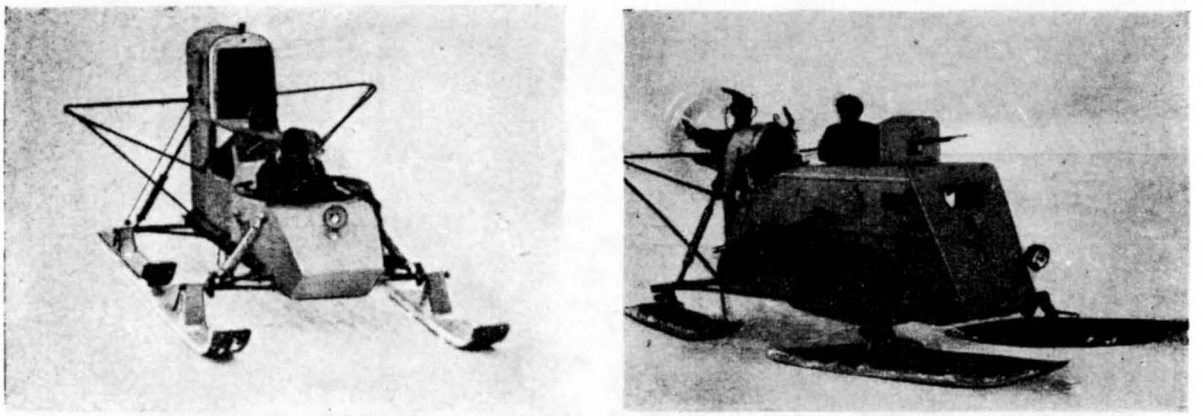


Figure 15. Light four-ski sleigh (left) and light armored sleigh (right).

Power is provided by aircraft engines mounted at the rear; the propellers are enclosed partially in a metal guard. Top speeds of between 20 and 30 miles per hour can be attained with loads of from 1,500 to 2,000 pounds. Skid brakes are fitted, and steering is effected by a standard steering wheel controlling either front or rear ski supports. Light armor is provided. Some types are completely closed; others are open. Machine guns may be mounted, and the sleighs are fitted with small headlights for night travel.

Figure 16. Three-ski sleigh personnel carrier.

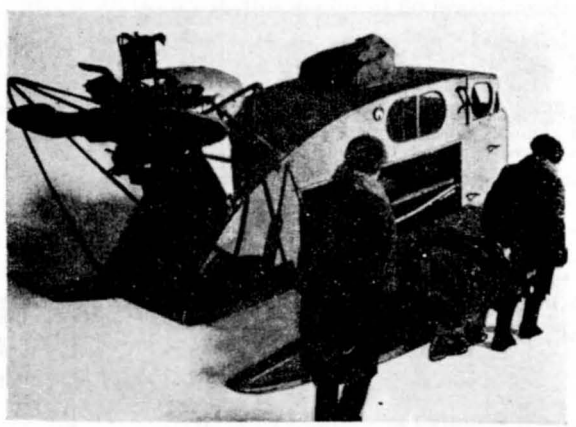


Figure 17. Utility sleigh.

2. TYPES OF SLEIGHS

a. Light, four-ski sleigh. The body of the light, four-ski sleigh (fig. 15) resembles a large motorcycle sidecar. It has two open aircraft-type cockpits. The driver sits in the rear cockpit. An aircraft engine is mounted on the rear. The radiator is located high above the driver's head. A small frame guard prevents the crew from walking into the propeller. It is believed that the vehicle is used primarily for light reconnaissance.

b. Lightly-armored sleigh. A heavier light-armored sleigh (fig. 15) is mounted on four skis. It is almost completely enclosed and is believed to have a crew of two. The driver sits in a forward

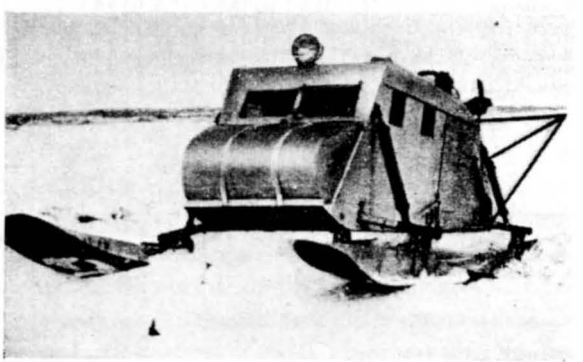


Figure 18. Transport sleigh.

position and observes through a slit in the sloping front. A hatch is provided in the roof for the machine gunner, who is protected by a raised shield. The sleigh is powered by a radial aircraft engine. A light tubular guard is fitted at the rear of the cabin. The vehicle is believed to be designed for armored reconnaissance.

c. Three-ski sleigh personnel carrier. The body to the rear of the driver's compartment enlarges into an enclosed cabin with side doors (fig. 16). A windshield and two headlights are fitted. The sleigh can carry from four to five men, or supplies. A large radial aircraft engine with frame guard is fitted at the rear.

d. Utility sleigh. The utility sleigh (fig. 17) can be used to evacuate wounded or to transport supplies or personnel. It is believed that a machine gun can be mounted in the cupola in the roof. A radial engine, fitted with a stream-lined cowling and the usual propeller guard, is located above the sloping rear of the sleigh.

e. Transport sleigh. The transport sleigh (fig. 18) has a broad front, and is unique in that it has a large fuel tank in the nose, below the double windshield. The position of the fuel tank suggests that the sleigh is designed only for work in rear areas or in quiet sectors.

PART II. FIRE CONTROL EQUIPMENT

Section I. DEVELOPMENT

1. GENERAL

The Soviets do not appear to have developed any outstanding types of fire control equipment. Soviet field artillery on-carriage fire control devices indicate that the Red Army's standards of accuracy, especially for initial rounds, are below those of the United States. The systems in use by the Red Army at the end of World War II represented, at the best, slight improvement over World War I systems. They are not, therefore, to be regarded as modern or as well-suited to present day requirements.

The Red Army undoubtedly is capable of designing adequate on-carriage fire control devices, but the production of such designs is contingent upon the development of a precision instrument industry.

Soviet on-carriage fire control for field artillery is based upon French and German systems and designs. All systems use a panoramic telescope resembling a simplified German *Rundblickfernrohr 32*. The first "modern" system was that introduced in 1906, employing a range arc of German origin. It still is employed today on obsolete artillery built prior to period 1927 to 1930.

After World War I, French influences were apparent for a time, beginning with the introduction of a Soviet version of the French Schneider quadrant sight on the 76-mm. infantry gun-howitzer M1927. A few years later, a Soviet M1930 version of the Schneider quadrant sight was fitted to newly designed and modernized artillery pieces. About 1936, these Schneider-type quadrant sights were replaced on newly manufactured pieces by the German-type quadrant sights, operating on the match-the-pointer system (similar to that used on German artillery during World War II).

In 1938, some newly manufactured pieces were fitted with an improved type of German quadrant sight, which substituted a more modern angle-of-site mechanism for the less satisfactory arced-scale type previously employed. A Schneider-type quadrant sight was reverted to for both the 76-mm. mountain gun M1938 and for the mass production model 76-mm. field gun M1942. The various Schneider- and German-type quadrant sights still are current, and appear to be used on pieces designed or modernized during the periods when the respective systems were in vogue.

The Schneider and German types of on-carriage fire-control systems are not considered modern or adequate by United States standards. The United States abandoned the Schneider-type quadrant sight in 1928, 11 years after adopting the original Schneider-type quadrant sight as the M1917. Also discarded, along with the M1917, was a match-the-pointer system considered superior to that used on World War II German and Soviet artillery.

The reason for the reversion to the Schneider-type quadrant sight for the 76-mm. field gun M1942 is believed to be economic. The German-type quad-

rant sight appears to require twice as much production time as the Schneider type, and affords only a slight increase in the accuracy of laying.

a. M1930 system. The M1930 system, still current, employs a Schneider-type quadrant sight mount with a panoramic telescope. The quadrant sight incorporates a range drum, with an elevation scale in Soviet mils (6,000-mil circle) engraved on the side. On the surface of the drum are one or more scales for various types of rounds and charges.

The angle-of-site mechanism is an arced scale, a level, and a micrometer with knob. To prevent movement of the parts during firing, the quadrant must be locked by a lever after cross-leveling. The M1930 quadrant sight is mounted on the right side of the piece, and is geared to the right trunnion.

The M1930 system is used on the following guns:

All 305-mm. pieces (obsolete).
203-mm. howitzer M1931.
122-mm. gun M1931.
152-mm. gun M1910/34.

The 76-mm. infantry gun-howitzer M1927 does not use this system.

b. M1906 system. The M1906 system is obsolete, but may be used on pieces manufactured prior to 1930. This system employs a conventional racked range arc, on which is mounted a panoramic telescope and an angle-of-site mechanism. The arc illustrated is engraved with one scale only. No automatic cant compensation is provided. This system is used chiefly on the 76-mm. field gun M1902.

c. German system. There are several variations.

Model sight:	*Piece on which used*
M1936	76-mm. field gun M1936.
M1939	76-mm. field gun M1939.
M1938	122-mm. howitzer M1938.
M1937	152-mm. gun M1942.
M1938	152-mm. howitzer M1938.
M1942	152-mm. gun M1942.
M1942	76-mm. field gun M1942.

d. Other devices. The Red Army is believed to have no gun-laying radar, with the exception of equipment obtained under Lend-Lease and matériel captured from the Germans.

The Red Army has developed a good system of sound and flash ranging and location. It has employed this method much more than the United States Army, but has not surpassed the United States systems.

The Soviets also employ conventional artillery slide rules, proportional scales, wind rosettes, and other plotting instruments common to all artillery units.

Delivery of fire by the Soviets is complicated because of the limitations of fire-control devices. These limitations make necessary detailed reconnaissance of missions and require forward observation posts manned by experienced and high-ranking artillery officers, if accurate fire is to be achieved. This would explain the Soviets seeming disregard for human life and matériel in sending scouts and observers into dangerous forward areas. In addition, the quality of fire-control equipment might account partially for the close-range employment of Red Army artillery.

The Soviets, in oversimplifying their fire-control system, have complicated the firing of the gun in combat; whereas, although the United States fire-control system appears to be complicated, the actual firing of the piece is simplified in combat.

2. LEND-LEASE EQUIPMENT

a. Directors.

Director	*Weapons on which used*
M5 and M5A1 (United States).	37- and 40-mm. guns.
M7, M7A1, and M7A1B1 (United States).	3-inch, 90-mm., and 120-mm. guns.
M9 (United States)	90-mm. gun.
M10 (United States)	4.7-inch gun.
M3A4 and M3A5 (British)	Obsolete 3-inch gun.
M14 (British)	5.25-inch gun.
M5 (British)	40-mm. gun.
M6 (British)	40-mm. gun.

b. Radar.

Set	*Weapons employed with*
SCR 268 (United States)	Searchlight and 3-inch gun.
SCR 545 (United States)	90- and 120-mm. guns.
SCR 547 (United States)	Gun laying and AA height finder.
SCR 584 (United States)	90-mm. guns.

c. Sights. The United States M7A1 for 40-mm. guns also had been obtained through Lend-Lease.

3. CAPTURED EQUIPMENT

All modern types of German fire-control equipment, including the new electronic fire-control director

(similar to the United States M9), are available to the Soviets from the Carl Zeiss plants at Jena and at Askania.

4. FUTURE TRENDS

The Soviets have had a tremendous amount of combat experience with artillery fire control. Also available is information obtained from United States and British matériel and from German equipment, scientists, and research. Consequently, it is anticipated that the Soviets will develop fire-control devices equal to present-day United States equipment.

It is estimated, however, that the Soviets will not be able to duplicate and put into production all of the matériel obtained from the United States at least until 1950.

Section II. ON-CARRIAGE EQUIPMENT

1. FIELD ARTILLERY SIGHTS

a. M1906 quadrant sight. The M1906 (fig. 19) is an obsolete type of sight, but still is employed on the artillery of that period, much of which still is in existence. It is graduated into 20-*sazhen* (140-foot) range divisions. The sight can be used for direct fire up to ranges of 2,200 yards.

Components are as follows:

(1) Panoramic telescope,
(2) Telescope socket,
(3) Collimator,
(4) Rack,
(5) Throw-out collar,
(6) Elevating knob,
(7) Retaining nuts,
(8) Sight mount bracket,
(9) Elevating mechanism,
(10) Longitudinal level,
(11) Angle-of-site level knob,
(12) Range scale,
(13) Sight clamp,
(14) Arc,
(15) Longitudinal level,
(16) Angle-of-site mechanism,
(17) Angle-of-site scale,
(18) Clamp lug.

Panoramic Telescope. The panoramic telescope (fig. 20) for the M1906 has a 360° traverse with a coarse 100-mil graduation and a vernier scale graduation of 1 mil. It has a ±300 mil elevation scale and a deflection scale which has a coarse graduation of 100 mils and a vernier graduation of 1 mil.

CHARACTERISTICS

Magnification	4×.
Field of view	10°.
Diameter of exit pupil	0.16 inch.

Components are as follows:

(1) Field of view selection knob,
(2) Field of view selection micrometer,
(3) Collimator,
(4) Rotating head,
(5) Azimuth scale,
(6) Azimuth micrometer knob,
(7) Body,
(8) Telescope retaining lug,
(9) Reticle light window,
(10) Eyepiece,
(11) Azimuth micrometer,
(12) Index,
(13) Worm gear housing,
(14) Field of view selection worm housing,
(15) Index,
(16) Field of view selection scale,
(17) Index,
(18) Worm throw-out lever,
(19) Positioning lug.

b. M1927 quadrant sight for 76-mm. gun. Components of the mount for the M1927 sight (fig. 21) are as follows:

(1) Cross level,
(2) Collimator,
(3) Sight mount body,
(4) Range drum index,
(5) Range knob,
(6) Nut,
(7) Throw-out lever,
(8) Sight mount bracket,
(9) Angle-of-site knob,
(10) Sight shank,
(11) Longitudinal level,
(12) Locking mechanism clamping lever,
(13) Angle-of-site mechanism,
(14) Angle-of-site scale,
(15) Cross leveling knob,
(16) Telescope socket.

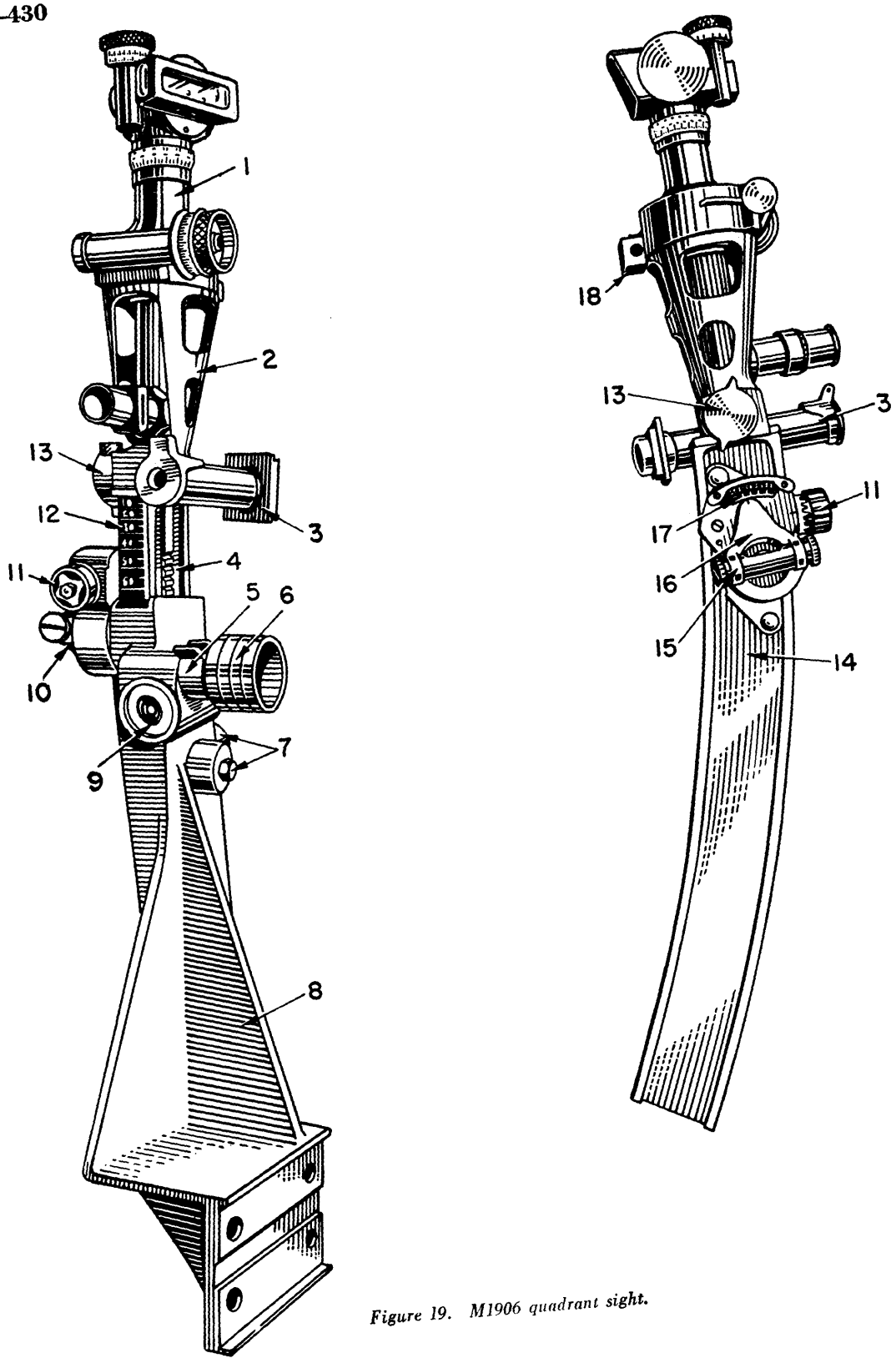


Figure 19. M1906 quadrant sight.

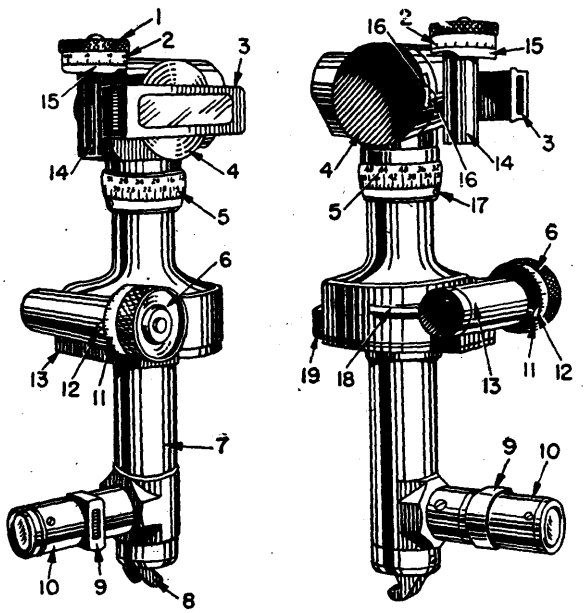


Figure 20. Panoramic telescope for M1906 sight.

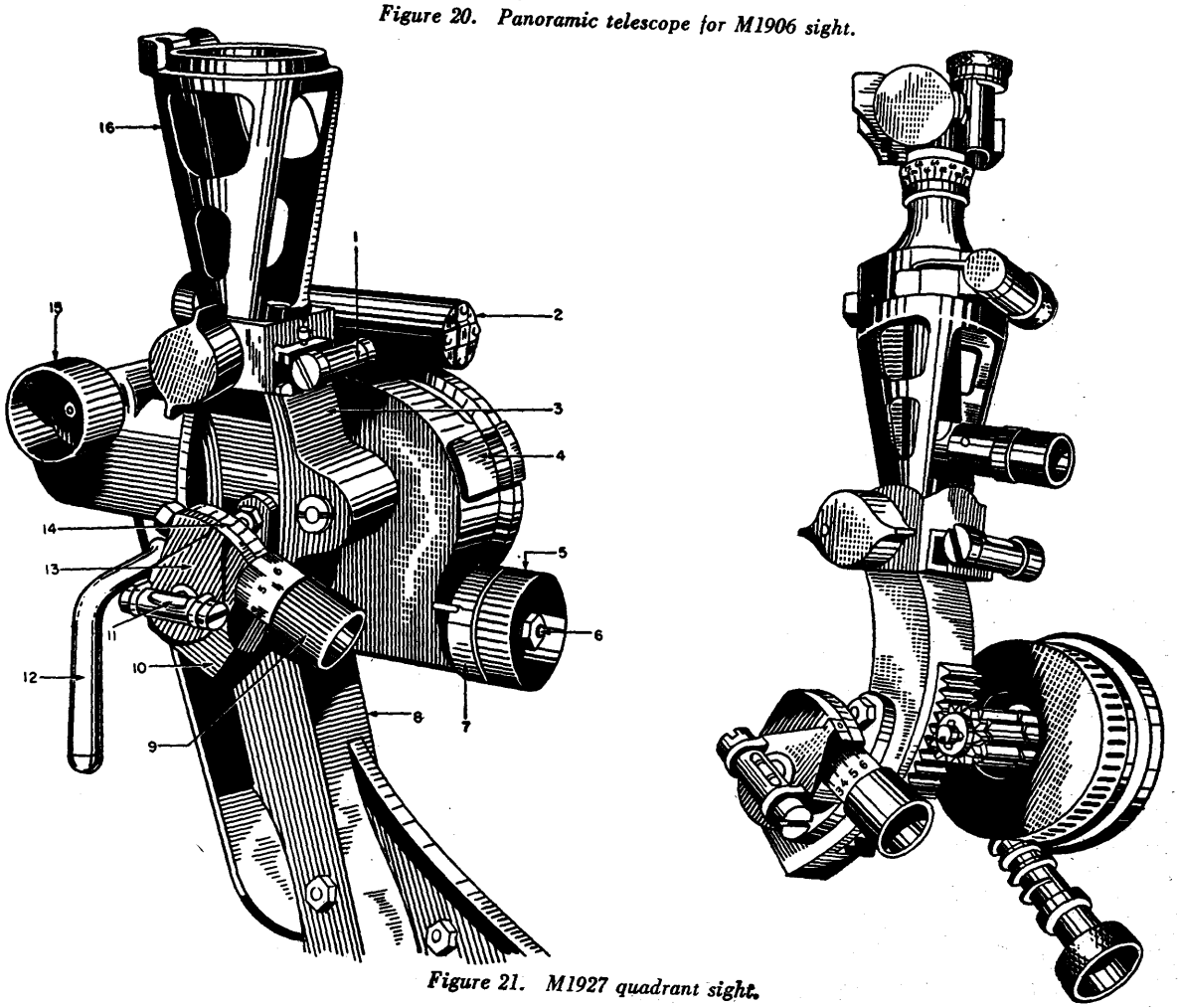


Figure 21. M1927 quadrant sight.

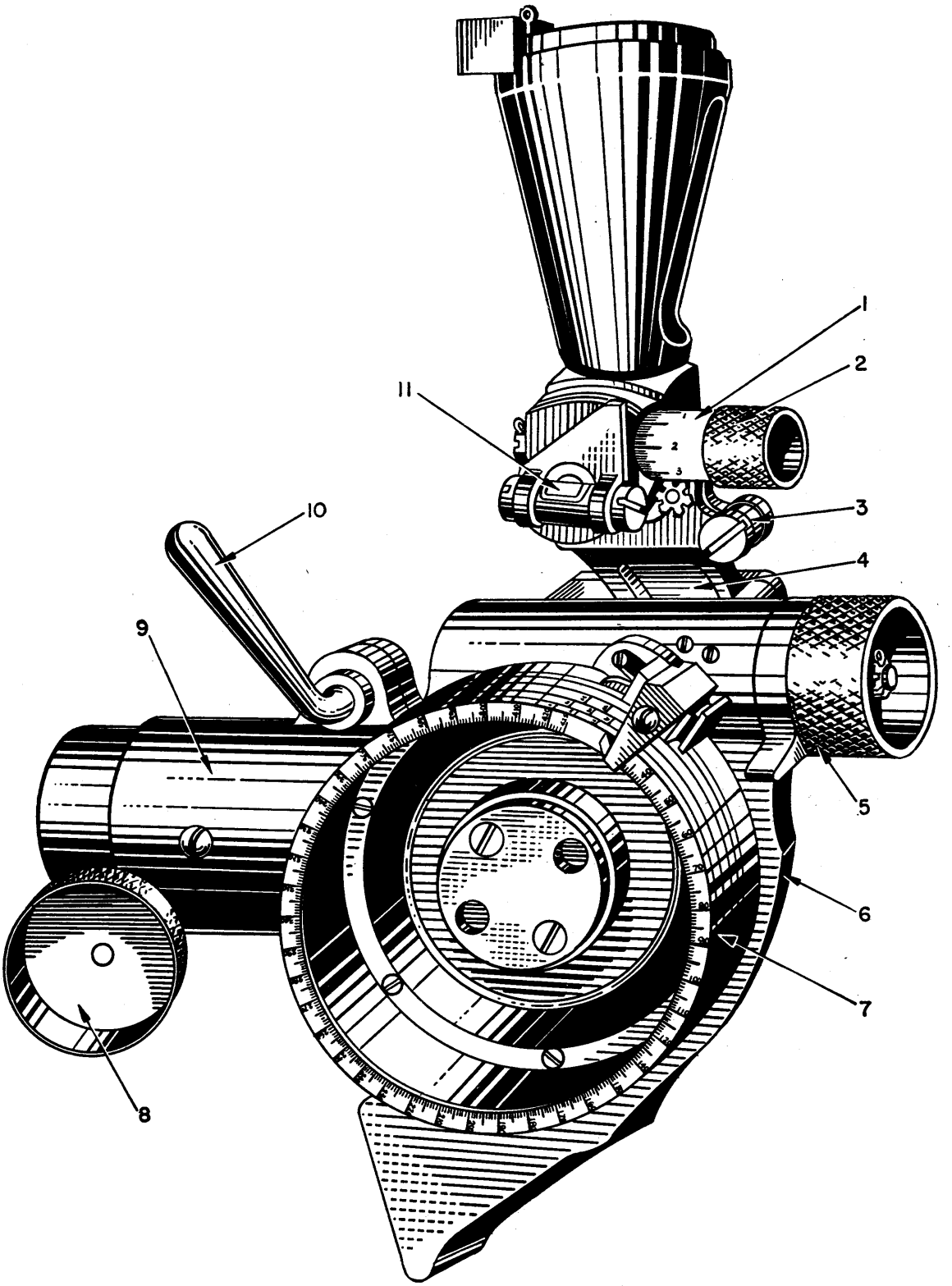


Figure 22. Mount for M1930 quadrant sight.

c. M1930 quadrant sight. The range drum (fig. 22) on the M1930 sight is divided into 750 mils. This scale eliminates the necessity for employing a different range scale for each type of ammunition and propelling charge.

Components of the mount are as follows:

(1) Angle-of-site micrometer,
(2) Angle-of-site knob,
(3) Cross level,
(4) Sight shank,
(5) Elevation knob,
(6) Sight mount body,
(7) Range drum graduated into 750 mils,
(8) Cross level knob,
(9) Sight mount bracket,
(10) Clamping lever,
(11) Longitudinal level.

d. 122-mm. gun sight. This is a telescopic-panoramic sight (fig. 23). Components are as follows:

(1) Nut,
(2) Joining plate,
(3) Gun reader arm,
(4) Nut,
(5) Positioning screw,
(6) Elevation handwheel,
(7) Lower bracket yoke,
(8) Sight reader arm,
(9) Sight bracket,
(10) Panoramic telescope locking clamps,
(11) Cross level,
(12) Setting screw handwheel,
(13) Drum,
(14) Index ring,
(15) Drum,
(16) Index,
(17) Scale drum,
(18) Level cover,
(19) Base level,
(20) Longitudinal level,
(21) Locking screw,
(22) Telescope socket,
(23) Longitudinal level knob,
(24) Adjusting screw,
(25) Range drum cover,
(26) Range drum,
(27) Quadrant seat.

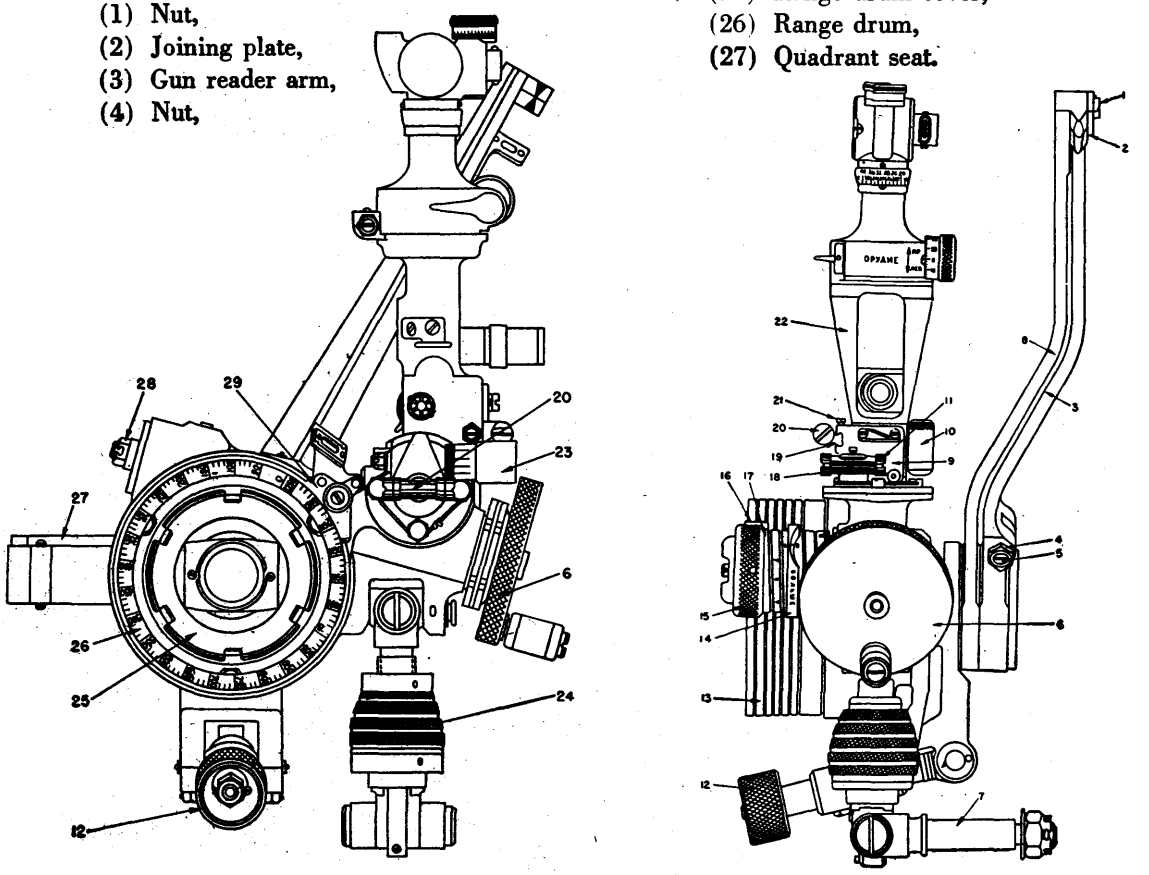


Figure 23. Sight for 122-mm. gun.

Illuminating device. An illuminating device, the Luch–4 (ЛУЧ–4) (fig. 24), is used with the 122-mm. gun sight.

Component parts are as follows:

(1) Electric cable,
(2) Range drum illuminating lamp,
(3) Junction box,
(4) Telescope reticle illuminating lamp,
(5) Panoramic sight scale illuminating lamp,
(6) Level illuminating lamp,
(7) Panoramic sight illuminating lamp,
(8) Connecting plug,
(9) Battery.

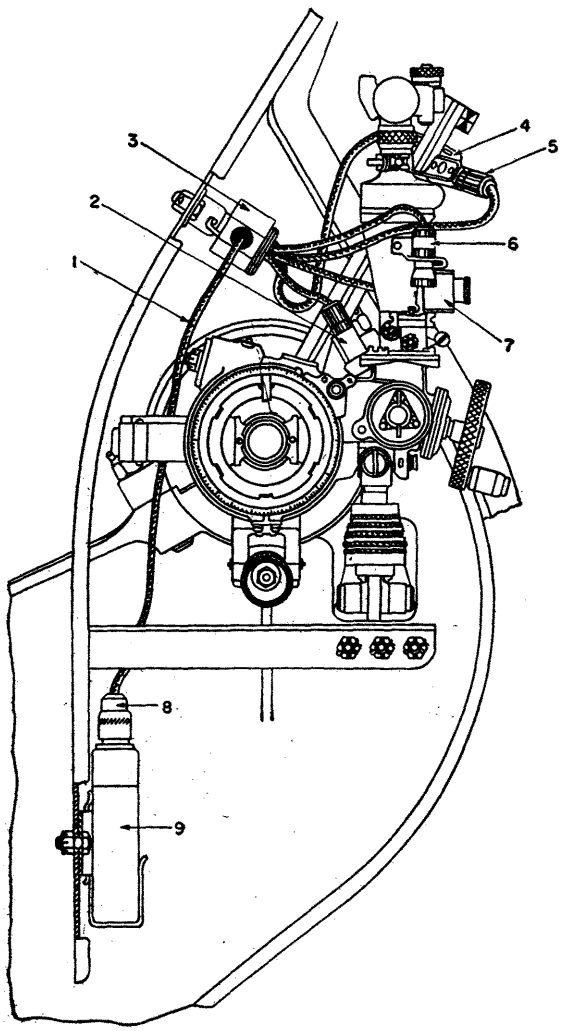


Figure 24. Illuminating device Luch–4 (ЛУЧ–4).

2. ANTITANK GUN SIGHTS

a. Antitank gun sight. Components of this sight (fig. 25) are as follows:

(1) Telescope elevation knob,
(2) Range scale,
(3) Azimuth micrometer scale.

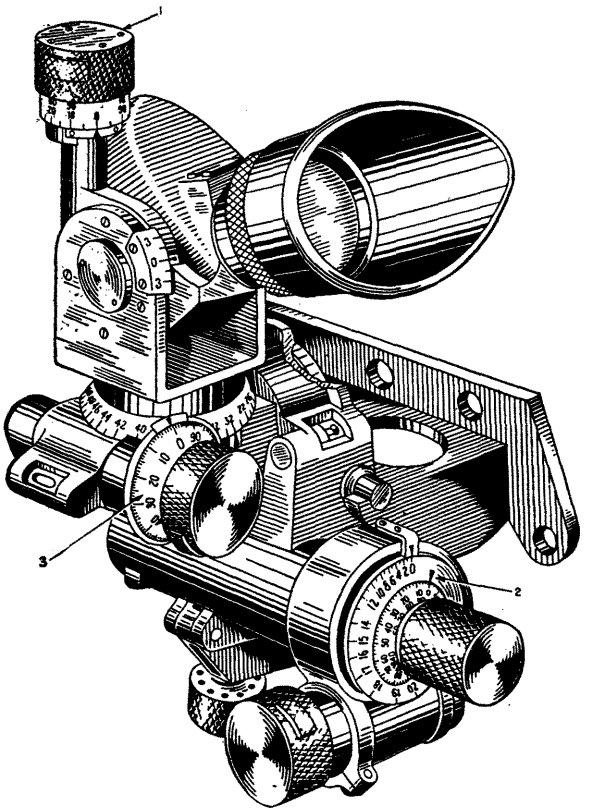


Figure 25. Antitank gun sight.

b. Antitank dial sight. A dial sight (fig. 26) is used on the 45-mm. antitank gun M1936.

CHARACTERISTICS

Field of view	19°.
Diameter of exit pupil	0.256 inch.

3. TANK GUN SIGHTS

a. Periscopic sight. A periscopic sight (fig. 27) is used with the 76-mm. gun mounted in T–34 tanks. The reticle in this sight is a grid, with five lateral 10-mil divisions on each side of the center line. Vertical range graduation is in 500-meter

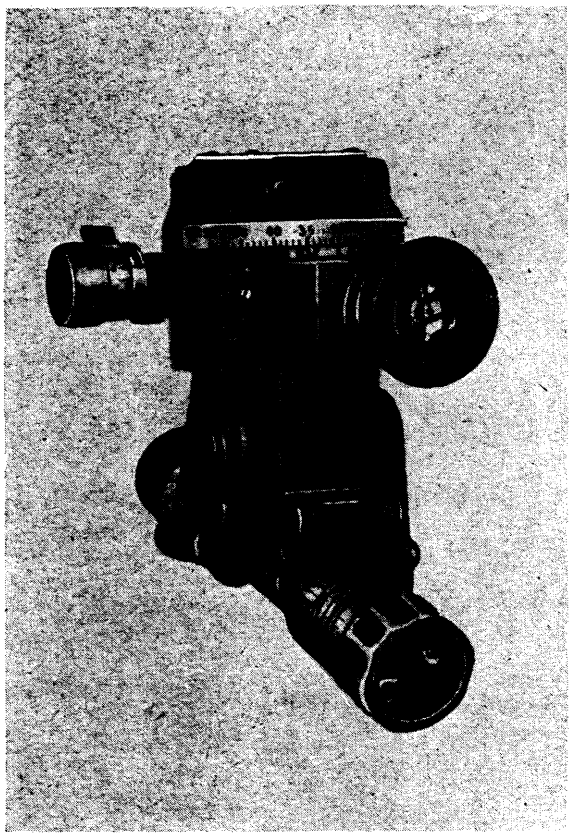


Figure 26. Antitank gun dial sight.

units, up to 2,000 meters. The following markings may be used to identify the sight:

H O108
ШР
СГ

CHARACTERISTICS

Magnification	2×.
Field of view	30°.
Diameter of exit pupil	0.24 inch.

b. Panoramic telescope. A panoramic telescope (fig. 28) is used in conjunction with tank-mounted 76-mm. guns.

The basic optical system for this telescope consists of a Harting Dove prism, placed between two telescopic systems. Each telescopic system may be adjusted independently of the other. There is a reticle in the focal plane of the objective, which is projected by the erecting lenses to the focal plane of the eyepiece. In the focal plane of the eyepiece there are two cross wires, which can be moved either horizontally or vertically. The movement of the two cross wires is controlled by two large knurled knobs positioned near the eyepiece. A knob at the base and to the rear of the telescope rotates the line of sight. On the right side of the telescope is a graduated dial, to which a lever is

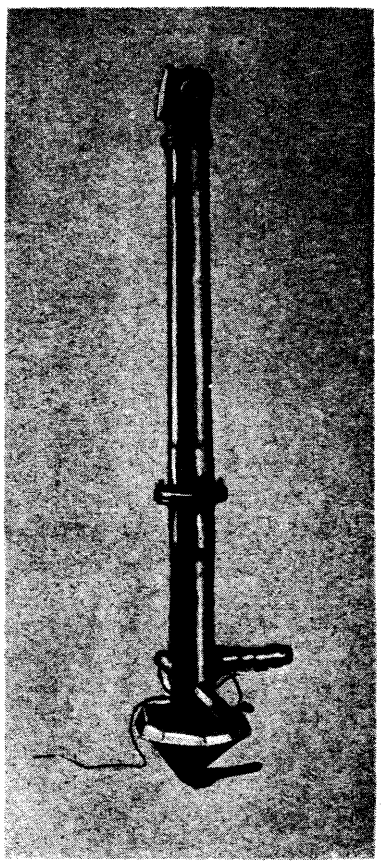


Figure 27. Periscopic tank sight.

attached. Rotation of the lever moves the line of sight vertically. Focus is controlled by a handwheel on the left-hand side.

Although the field of view of the telescope is 25°39′, the definition is not good beyond a field of 12°. This sharp reduction in definition occurs because only a single doublet lens is used for the objective system.

CHARACTERISTICS

Magnification	2×.
Field of view	15°.
Diameter of exit pupil	0.18 inch.
Optical length	28.35 inches.

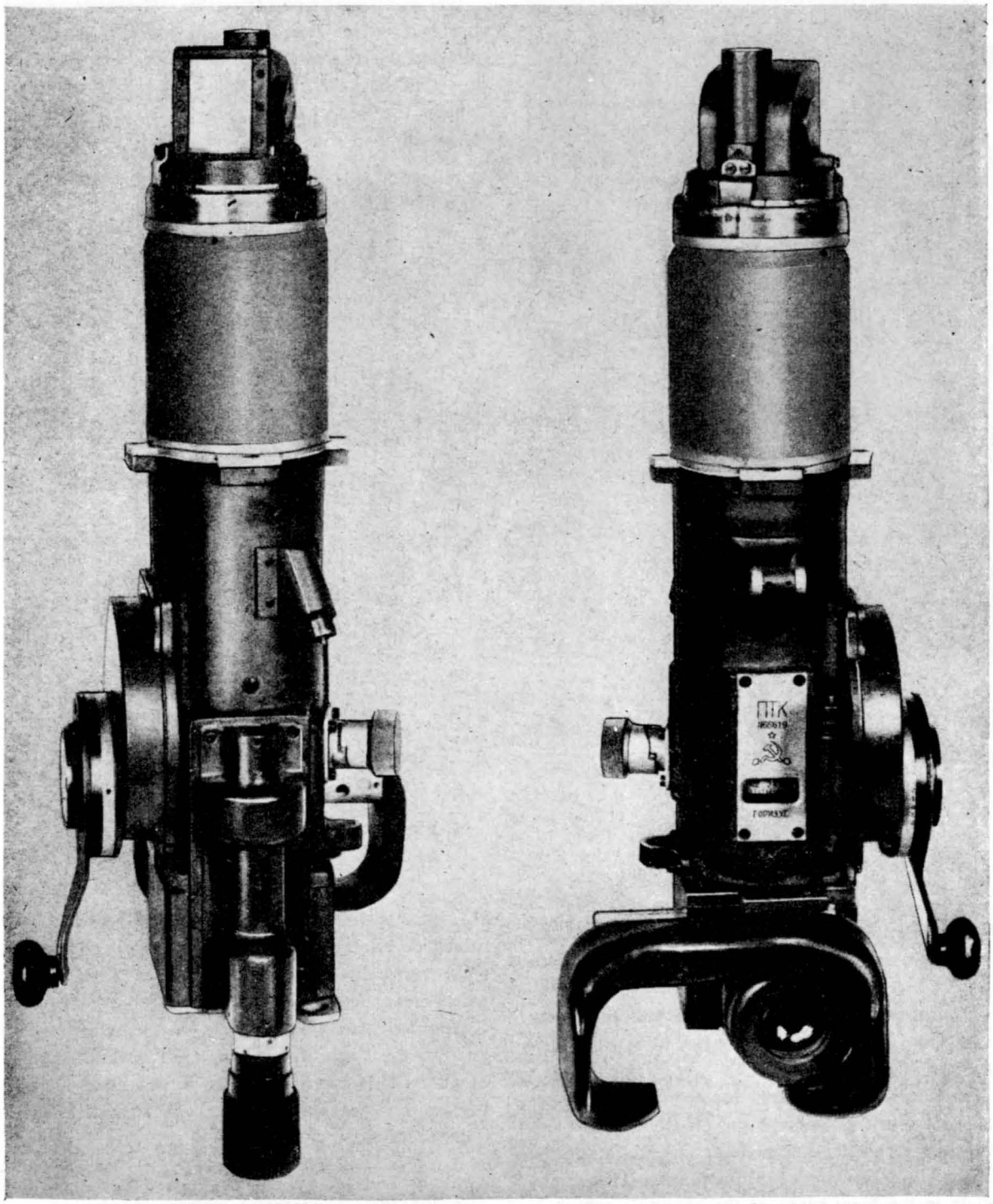


Figure 28. Panoramic tank telescope.

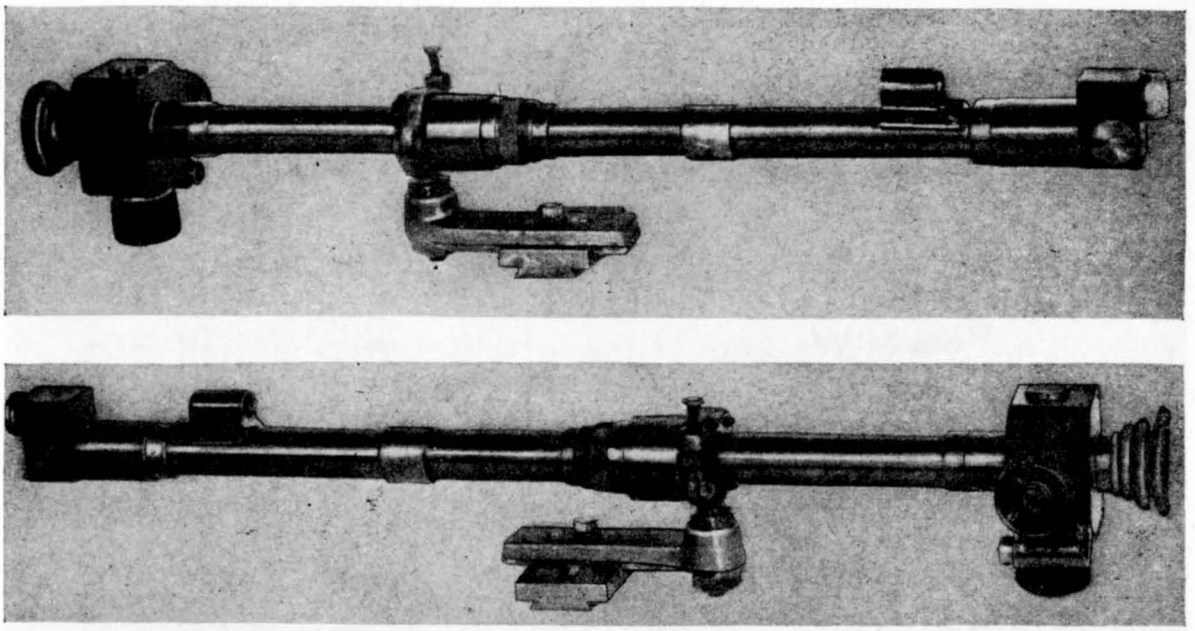


Figure 29. Direct fire tank telescope.

c. Direct fire telescope. It is believed that this sight (fig. 29) is used to direct the fire of tank-mounted 76-mm. guns.

The optical system is somewhat similar to that used on United States tank sights. The exit pupil diameter is small, only 4.5 millimeters. A feature of the Soviet telescope is the offset, at the objective end of the sight, caused by the introduction of two right angle prisms. This prism system provides a means for adjusting the telescope in elevation with reference to the gun. The upper prism can be rotated from outside the telescope, while the lower prism always remains in a fixed position. The telescope is provided with a reticle in the focal plane of the objective and vertical and horizontal cross wires in the focal plane of the eyepiece. The two cross wires can be moved laterally or vertically by two knurled knobs, which are located at the eyepiece end of the telescope.

CHARACTERISTICS

Weight	17.64 pounds.
Optical length	54.33 inches.

4. ANTIAIRCRAFT GUN SIGHTS

a. 37-mm. antiaircraft sight M1939. The M1939 sight (fig. 30) is used for direct fire against air and ground targets with the 37-mm. antiaircraft gun M1939. It is a combination of two reflex sights and a computing mechanism, which steers the sights through a parallel linkage to the correct deflections for azimuth, angle of site, and super-elevation.

Initial data, consisting of range (actual or estimated), target speed (actual or estimated), target course (estimated), and angle of dive or approach (estimated), is set in, and the quadrant elevation and the angle of train are transmitted to the gun. Range usually is supplied by a 1-meter base range finder (fig. 30).

Limitations of the sight are:

Target speed	150 yards per second.
Present and future range	220 to 4,400 yards.

b. 25-mm. reflex sight M1941. A reflex type of sight is reported to be used with the 25-mm. antiaircraft gun M1941. This sight may be similar to the sight used with the 37-mm. antiaircraft gun M1939.

c. Antiaircraft sight 76-mm. M1938 and 85-mm. M1939. This equipment has an independent elevation sighting line, i. e., the line of sight can be directed on to the target without moving the barrel. It is erected as an indicator sighting sys-

Figure 30. M1939 37-mm. antiaircraft sight employed in conjunction with 1-meter base range finder.

tem, and allows a simple following of the target in elevation by means of a sighting linkage. The gunner moves the barrel in elevation by means of the elevating gear by bringing the two pointers into coincidence. The line of sight is dependent on bearing, and the sighting apparatus is fixed to the right and left sides of the gun. On the right side are the elevating gear, tangent elevation and lateral deflection linkages, and a telescopic sight No. 2A. On the left side are the vertical deflection linkage, barrel and sight indicators, graduated elevating arc, and bearing circle. Magnification of the telescope is 5×, and the field of view is 14°.

5. MACHINE GUN SIGHTS

a. Ring sights. Machine guns are equipped with ring sights 216 and 218.

Section III. OFF-CARRIAGE EQUIPMENT

1. RANGE AND HEIGHT FINDERS

a. General. Soviet range finders also can be used as height finders, and are used in this dual role by field units. Stereoscopic equipment with a base of 4 meters or less is used. Equipment is patterned after the German *EM–1mR* and the Polish *EM–2mR*. There also is an EM–4mR of Soviet manufacture, which consists of a center piece and two covered side-lengthening pieces. The 1-meter base stereoscope range finder is used with antiaircraft automatic weapons and with mortars. When used with antiaircraft automatic weapons, it is located from 10 to 15 yards to the rear of the base piece, and data is transmitted by voice.

b. DYA. This instrument (fig. 31) indicates azimuth, elevation, and height or range.

CHARACTERISTICS

Base length	4 meters.
Weight (in operation)	715 pounds.
Weight (in transit)	1,736 pounds.
Magnification	12× and 24×.
Field of view	2° and 1° 30′.
Diameter of exit pupil	0.14 inch and 0.07 inch.
Inclination of eyepiece axis	−24° to +90°.
Maximum range	54,000 yards.
Minimum range	2,200 yards.
Minimum height	200 feet.
Maximum height	65,000 feet.

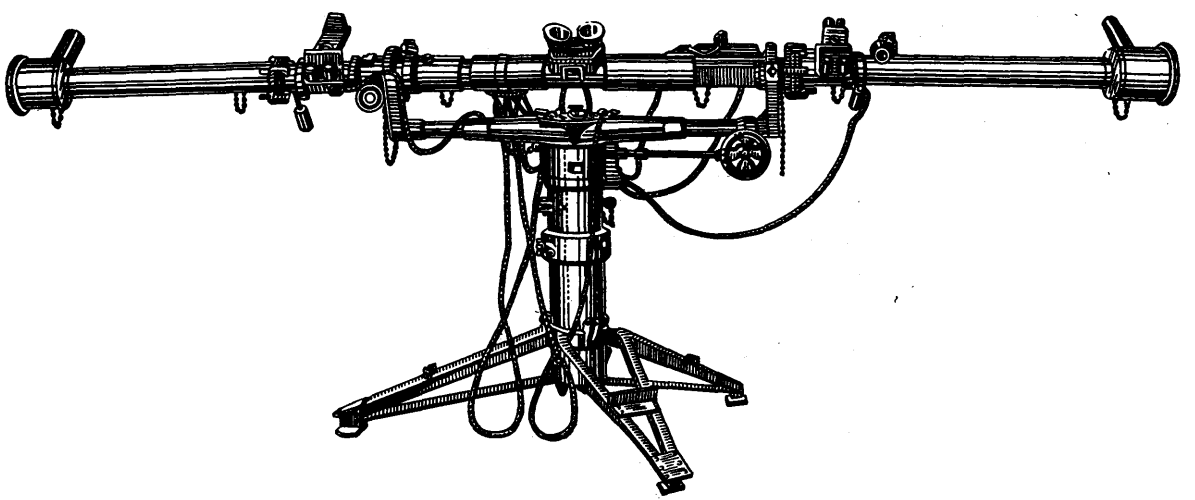


Figure 31. DYA 4-meter base range finder.

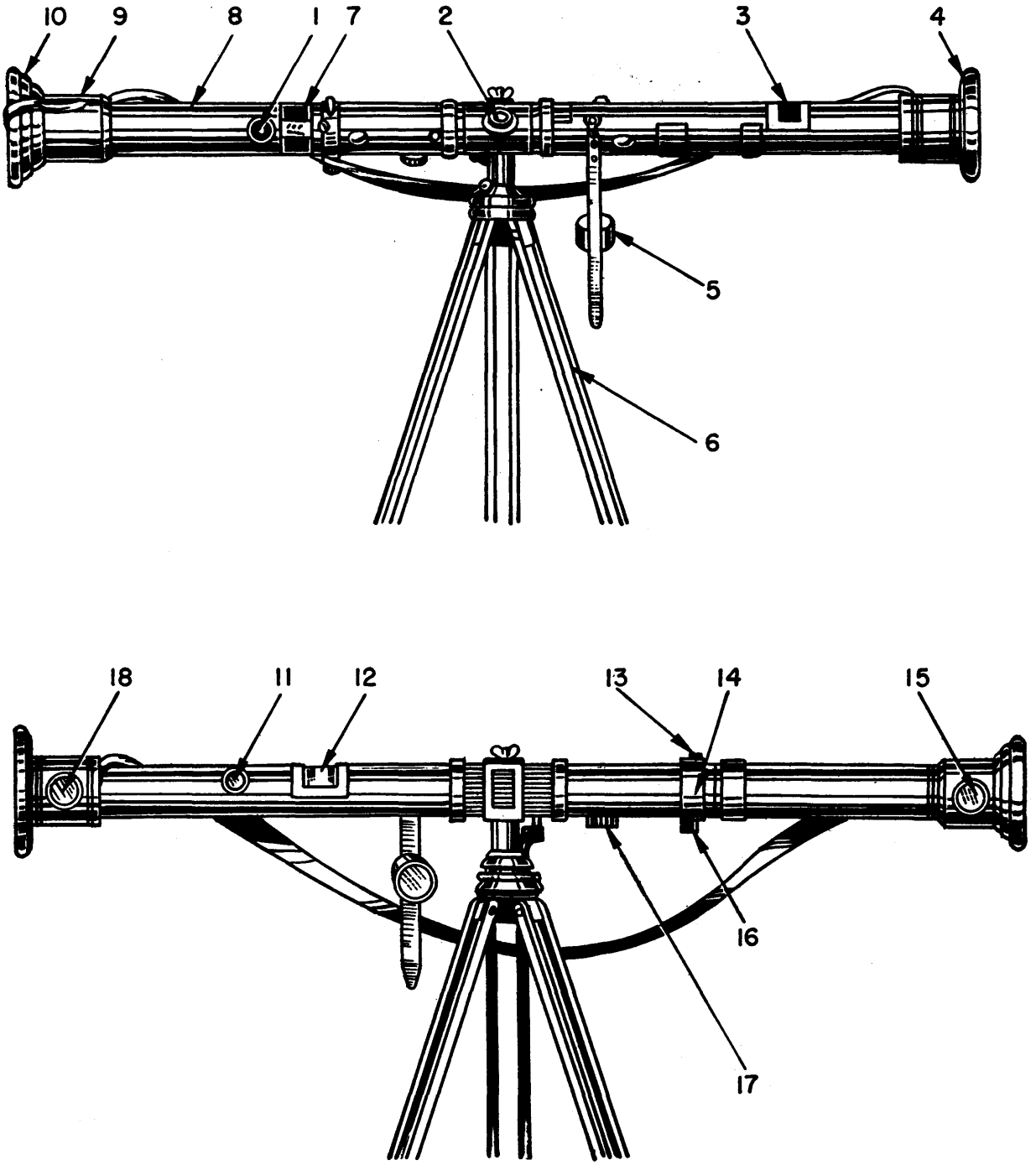


Figure 32. Equipment "Invert."

c. Equipment "Invert." A device for computing vertical height from slant range and angle-of-site is included in this equipment (fig. 32).

CHARACTERISTICS

Base length	1.25 meters.
Magnification	15×.
Field of view	2° 44′.
Diameter of entrance pupil	1.36 inches.
Diameter of exit pupil	0.091 inch.
Inclination of eyepiece axis	60°.
Maximum usable range	16,400 yards.
Minimum usable range	700 yards.

Principal components are as follows:

(1) Range scale eyepiece,
(2) Eyepiece,
(3) Range measuring roller,
(4) Leather buffers,
(5) Leather eyepiece cover,
(6) Tripod,
(7) Protection sleeve,
(8) Tube,
(9) Protection sleeve,
(10) Leather buffer,
(11) Internal scale window,
(12) Range measuring roller,
(13) Level,
(14) Site angle measuring device,
(15) Objective window,
(16) Operating handwheel for angle-of-site device,
(17) Astigmatizer knob,
(18) Objective window.

d. DTS. The DTS range finder is equipped with a geared graphical mechanism which indicates height in relation to angle of site and indicates range.

CHARACTERISTICS

Base length	2 meters.
Weight (in operation)	211.4 pounds.
Weight (in transit)	487.2 pounds.

2. DIRECTORS

a. General. The Red Army refers to directors as "ПУАЗО" (PUAZO).

The following types are known to be in use:

PUAZO 2	M5 (U. S.)
PUAZO 3	M7 (U. S.)
Sperry T8 (U. S. M3)	M9 (U. S.)
Vickers (British Mk I)	M10 (U. S.)

b. PUAZO 2. The PUAZO 2 director (fig. 33) is used for heavy antiaircraft fire control, although it is now considered obsolescent.

This instrument functions on the horizontal ground range principle and consists of three major

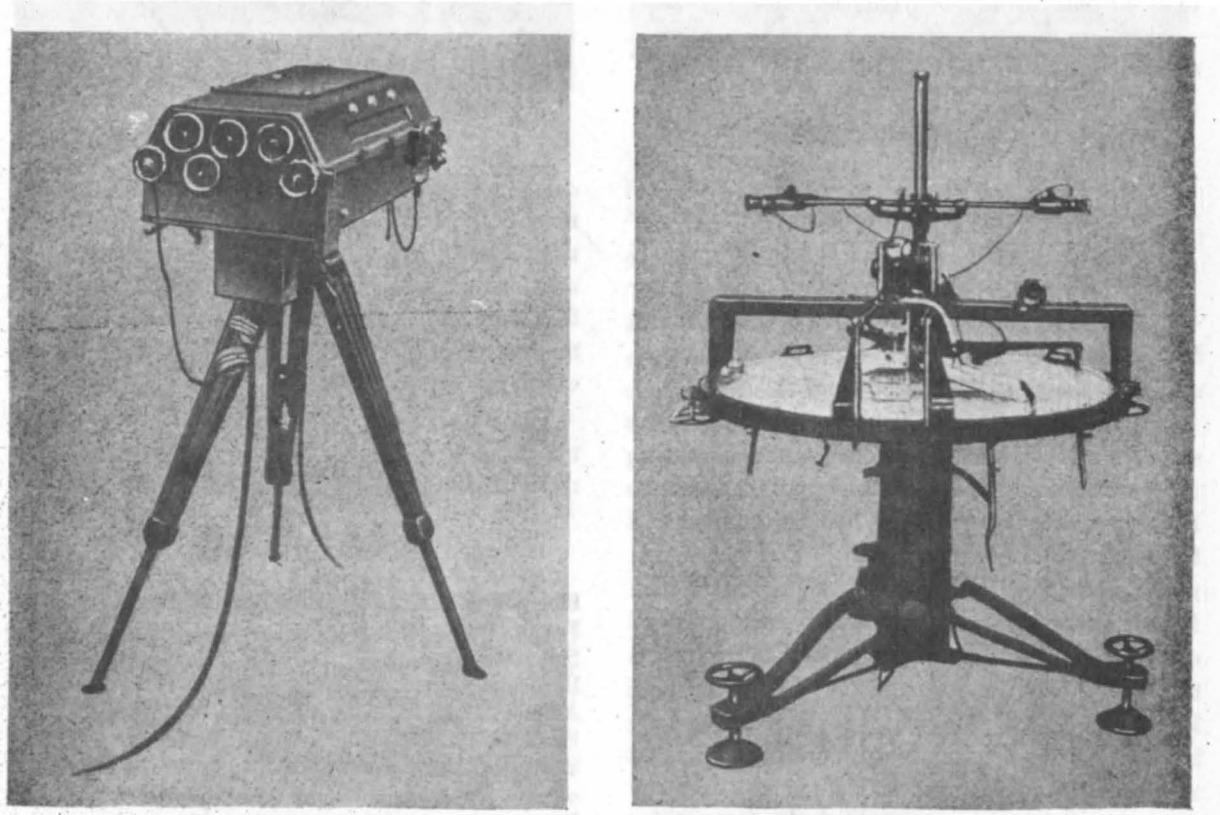


Figure 33. PUAZO 2 director and computer.

727212°—47——3

components: a 4-meter base DYA range finder; a plotting table; and a computer or ballistic converter.

The initial data required are: Height (determined with the DYA range finder); azimuth; and the angle-of-site. Firing data is prepared by the computer (fig. 33).

Corrections can be made to height, course angle, target speed, future bearing, quadrant elevation, and fuze. Data is transmitted from predictor to guns through a 16-conductor cable, 164 feet long, and a junction box. Current is supplied by a battery. Azimuth, quadrant elevation, and fuze are transmitted to the gun receiver dials through three transmitters in the predictor. The blacking-out of two pointers on the gun dials ensures parallelism between fire control instruments and guns. The transmission system has the great disadvantage that the receivers do not line up automatically when the current is switched on. The receivers, therefore, always must be tested after a break in the circuit. During continuous tracking, the receivers tend to lag, and the lag will increase directly in proportion to the increase in the rate of change.

The equipment, which is carried in two trucks is manned by a detachment of 11 men.

CHARACTERISTICS

Traverse	360°.
Altitude range	0 to 7,630 yards.
Slant range	545 to 9,810 yards.

c. PUAZO 3. This stereoscopic fire director (fig. 34) is not a modern apparatus in the U. S. and British meaning of the word. It is of peculiar construction thought to be copied from Skoda.

The instrument works principally on the same system as the PUAZO 2. It determines continuous firing data for engaging targets by predictor control. It registers the target course, and adjustments can be made for changes in height. The instrument works on the angular travel method, and firing data for the future position is derived from the rate of change of range and bearing. Initial data required is the present height (determined by the 4-meter base DYA range finder), the present angle-of-site, and the bearing. After determining the present horizontal range, the future bearing, and the height from the computer, firing data is established. Corrections

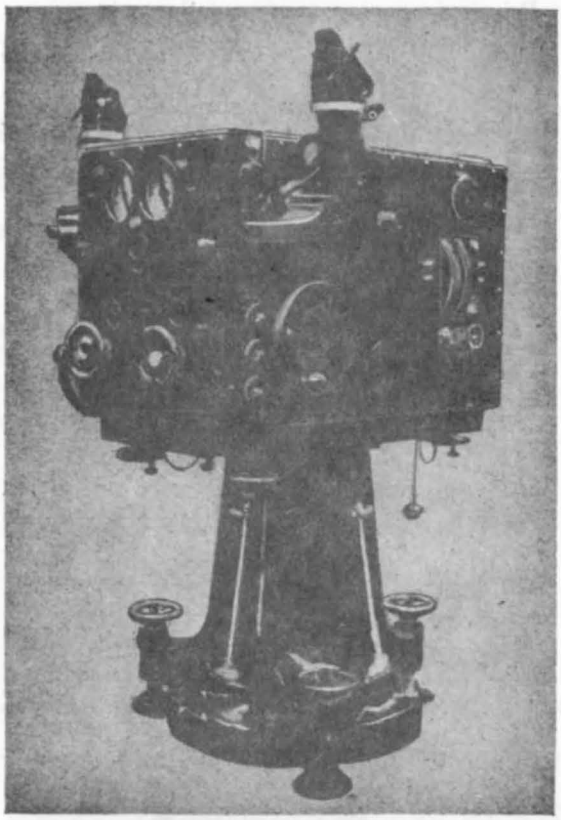


Figure 34. PUAZO 3 director.

can be made to height, future range, future azimuth, time of flight, quadrant elevation, and fuze. Data is transmitted through the most modern Soviet transmission system, SPT, using cables up to 164 or 328 feet long. Power for the transmission system and the motors in the predictors is supplied by two sets of storage batteries, 65 to 70 volts.

The PUAZO 3 is operated by an instrument detachment of one commander and eight men. It is mounted and operated on a single-axled trailer.

CHARACTERISTICS

Future height	0 to 31,500 feet.
Future range	550 to 13,100 yards.
Slant range	872 to 14,170 yards.
Horizontal range	872 to 13,080 yards.
Altitude	545 to 9,810 yards.
Elevation	0° to 80°.
Vertical component of target speed.	99 to 297 feet per second.
Fuze range	0 to 38 seconds.

3. ANTIAIRCRAFT SOUND LOCATORS

a. DE–1930. The DE–1930 consists of six sound collectors, a recording apparatus, a warning device, telephone, six control devices, a 12-volt and an 80-volt storage battery, corresponding wire lines, spare parts, and auxiliary appliances.

b. ST–4. This instrument consists of four trumpets supported by a tripod mounting.

CHARACTERISTICS

Range (maximum)	8,800 to 9,800 yards.
Range (practical)	5,500 to 6,600 yards.
Margin of error	−2° to +3°.
Traverse	360°.
Elevation	−5° to +90°.

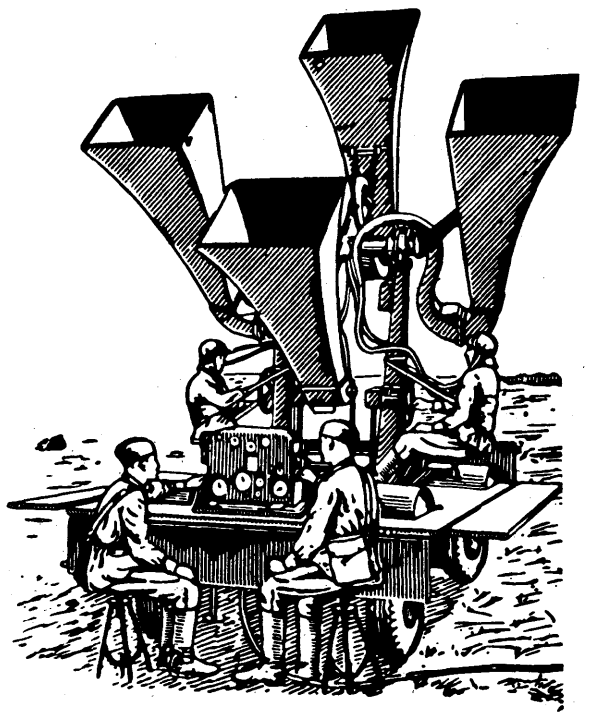


Figure 35. ST–5 sound locator.

c. ST–5. This instrument (figs. 35 and 36) is a further development of the ST–4. The triple-axled ZIS–6 truck serves as a self-propelled mount. Four rectangular-shaped trumpets are fixed in the normal manner to a column, and felt covers are used to deaden wind noise. Sound delay, wind influence, and refraction caused by high temperatures can be eliminated.

Figure 36. ST–5 sound locator.

CHARACTERISTICS

Range (maximum)	13,100 to 16,400 yards.
Range (practical)	7,600 to 9,800 yards.

4. TELESCOPES

a. BST. The BST (fig. 37) is a 10-power telescope used by battery commanders. It is a sturdily-constructed scissors type instrument resembling, except for minor details, the German *SF–14–Z*. The telescope contains five major assemblies: head prism assembly, objective assembly, erecting prism assembly, reticle assembly, and eyepiece assembly. Damage is corrected by assembly replacement.

CHARACTERISTICS

Field of view	5°.
Magnification	10x.
Accuracy	1′.
Diameter of exit pupil	0.197 inch.
Diameter of entrance pupil	1.968 inches.
Stereoscopic effect:	
Tubes in vertical position	3.
Tubes in horizontal position	11.
Periscopic length	11.81 inches.

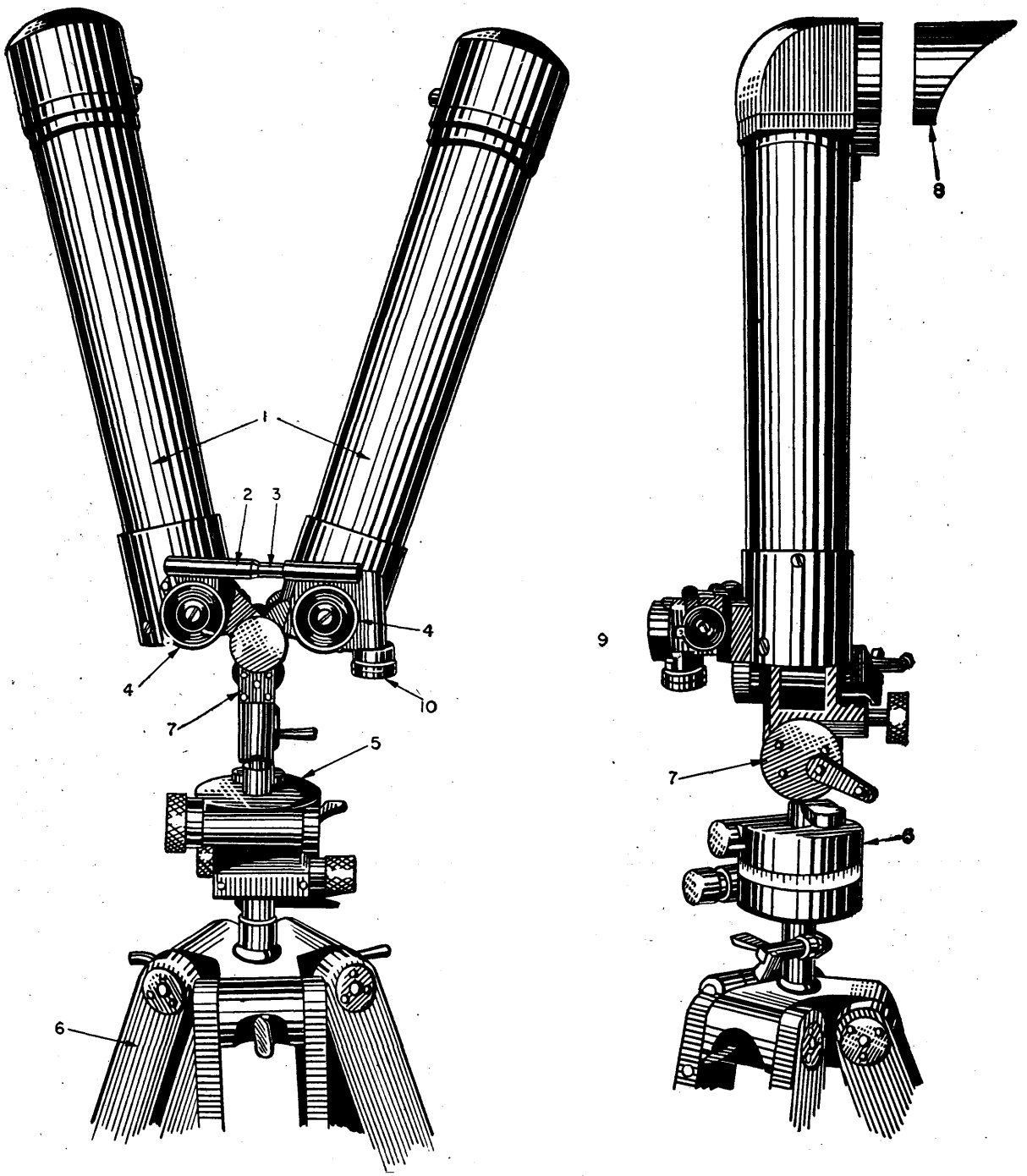


Figure 37. BST battery commander's scope.

Principal components are as follows:

(1) Tubes,
(2) Outer sleeve of interpupillary adjustment,
(3) Inner sleeve of interpupillary adjustment,
(4) Eyepieces,
(5) Azimuth scale,
(6) Tripod,
(7) Tipping hinge,
(8) Sun shades,
(9) Angle-of-site mechanism,
(10) Reticle erecting screw.

b. Azimuth axle mount for BST. Principal components of the azimuth axle mount (fig. 38) are as follows:

(1) Shaft,
(2) Index,
(3) Azimuth knob,
(4) Azimuth micrometer,
(5) Orienting knob,
(6) Clamp nut,
(7) Lower housing,
(8) Azimuth scale,
(9) Index,
(10) Throwout,
(11) Upper housing,
(12) Circular level.

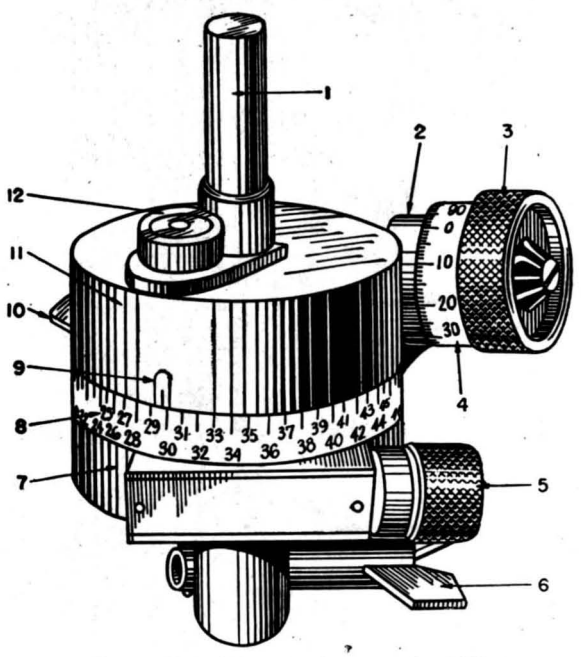


Figure 38. Azimuth axle mount for BST.

5. PERISCOPES

Two types have been identified. For Razvedchik periscope, see fig. 39.

CHARACTERISTICS

	Razvedchik	*PDN*
Periscope length	1.3 feet	11.4 feet.
Over-all length	1.9 feet	19.7 feet.
Weight	3.1 pounds	
Weight (with case)	21.6 pounds	61.7 pounds.
Magnification	4 ×	10 ×.
Field of view	11° (183 mils) [1]	5° (87 mils).[1]
Diameter of exit pupil	0.16 inch	0.20 inch.

[1] Soviet mil: 6,000 per circle.

Figure 39. Razvedchik hand periscope.

6. BINOCULARS

Nine types of binoculars (figs. 40 and 41) have been identified.

Type	Magnification	Field of view		Diameter of exit pupil (inches)	Diameter of entrance pupil (inches)	Weight (pounds)
		Degrees	Mils			
	6 ×	8.5	142	0.20	1.2	1.59
	6 ×	8.5	142	0.20	1.2	.....
	8 ×	8.5	142	0.20	1.6	.....
	6 ×	8.5	142	0.20	1.2	.....
	8 ×	6.2	105	0.20	1.6	3.3
	8 ×	8.75	146	0.20	1.6	4.2
10 x 50.....	10 ×	7.3	128	0.20	2.0	2.7
12 x 40.....	12 ×	4.2	73	0.12	1.6	2.4
18 x 50.....	18 ×	2.8	49	0.11	2.0	2.4

Note: Soviet mil is 1/6000th of a circle.

Figure 40. Characteristics of Soviet binoculars.

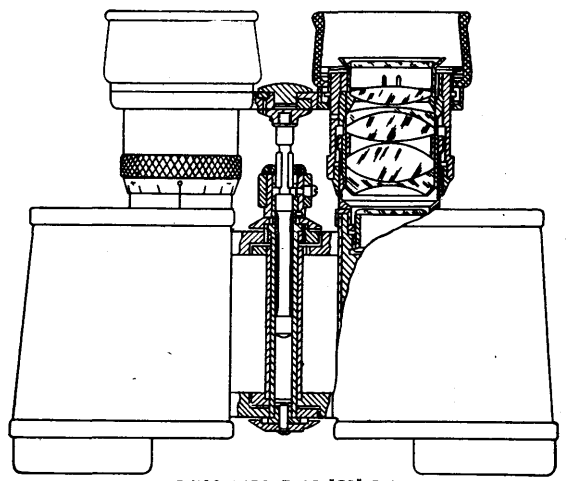
7. AZIMUTH INSTRUMENTS

Soviet aiming circles are much coarser than comparable United States models.

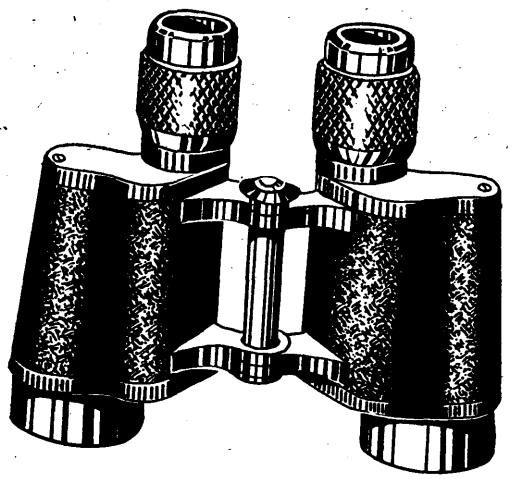
a. BMT aiming circle. For details, see figure 42.)

CHARACTERISTICS

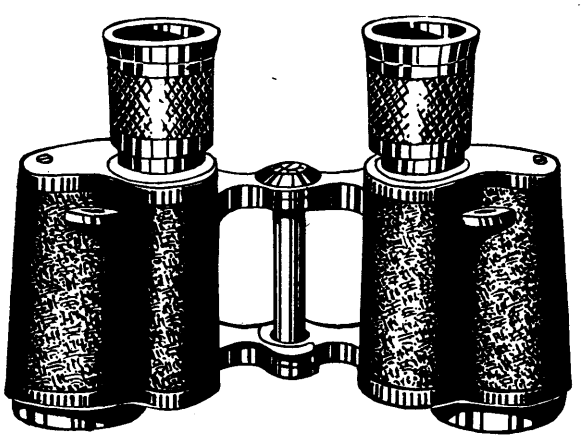
Magnification	6 ×.
Field of view	6°5′.
Diameter of exit pupil	0.098 inch.
Weight	2.8 pounds.
Weight (instrument, tripod, and case)	12. 8 pounds.
Azimuth scale graduations	20 mils.
Elevation scale graduations	100 mils.
Elevation-depression limitations	± 300 mils.
Reticle graduations	5 mils.



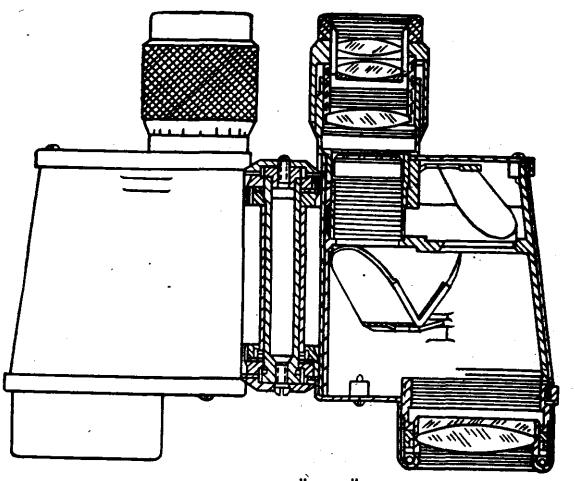
BINOCULARS TYPE "5B" (BV)



BINOCULARS TYPE "5-6" (B-6)

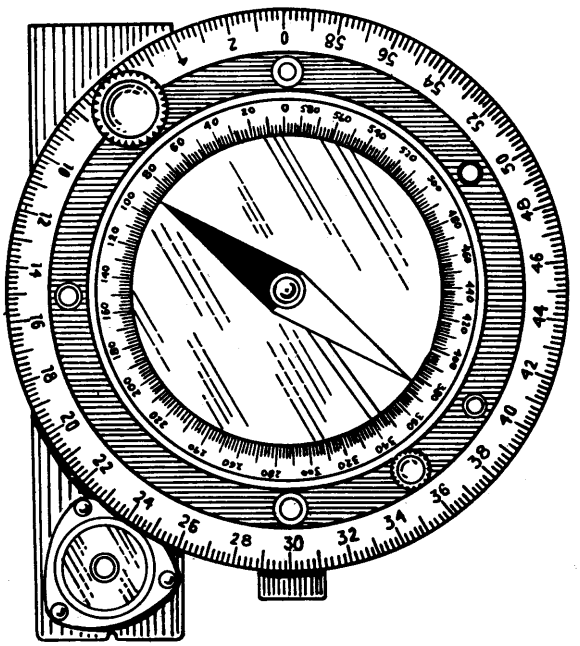


BINOCULARS TYPE "5-1" (B-1)



BINOCULARS TYPE "5-2" (B-2)

Figure 41. Soviet binoculars.



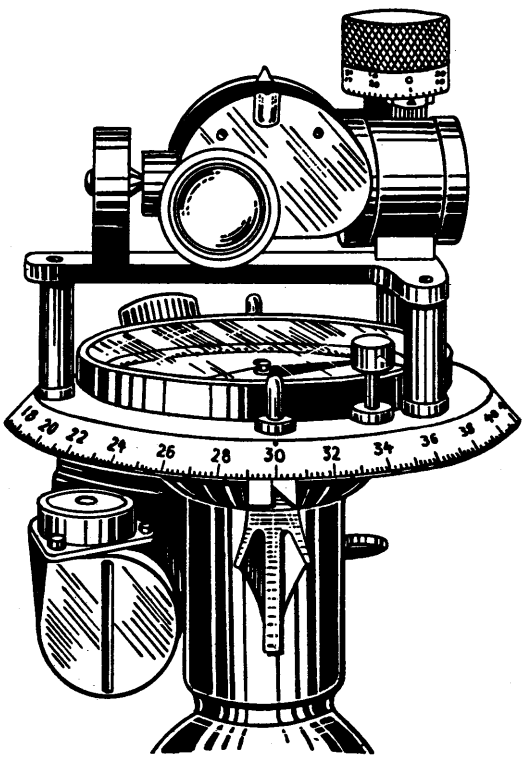


Figure 42. BMT aiming circle.

b. Periscopic aiming circle. A periscopic aiming circle (fig. 43) also is used. The reticle graduations are in 1-mil divisions.

c. Machine gun aiming circle. The machine gun aiming circle is identical to the BMT, except that it is of much lighter construction. It weighs 2.31 pounds with the case and 1.65 pounds without the case.

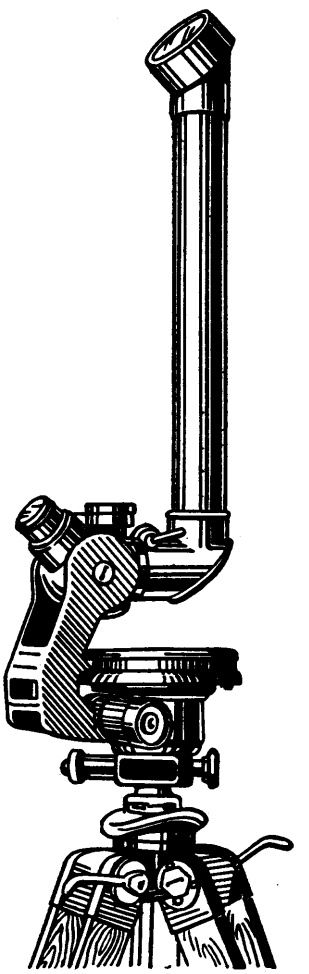


Figure 43. Periscopic aiming circle.

8. SOUND RANGING EQUIPMENT

a. General. The Soviets have made wide use of sound ranging equipment for counterbattery operations since 1909. This type of equipment is superior to optical equipment when used in cold, fog, snow, or rain. Thus, it is suited to conditions in the U. S. S. R. This equipment also may be

used to adjust fire, but seldom is used with calibers smaller than 107-mm.

b. Equipment. A sound ranging set consists of three pairs of ranging posts and a central control station. The posts normally are surveyed in before operation, although methods exist which obviate the need for surveying. Each post is equipped with a sensitive microphone, coupled to a recording tape similar to that used in the central control station. The microphones are buried just below the surface of the ground to eliminate surface noises. The data is relayed from the ranging post to the central station by special low resistance cable or by supersensitive radio equipment.

The central control station receives the data on a recording tape, one for each of the ranging stations. The pattern on the tape indicates the nature of the source of the sound recorded. The time difference of the sound as registered by each ranging post is recorded automatically at the central station. This recording serves as the basis for further computation on special sound ranging slide rules and graphical tables to locate the origin of the sound by converging rays.

9. FLASH RANGING EQUIPMENT

Observation posts employ battery commanders scissors telescope, stop watches, and range finders. The battery commanders scissors telescope is modified so that two persons can observe simultaneously; one tube is fitted with an additional eyepiece. An optical range finder also is employed. All optical instruments are equipped with lighting devices to aid night observation. For observing at long ranges, a monocular tube, which has three eyepieces to develop magnification of 15×, 23×, and 30×, is used.

Section IV. SUPPLEMENTARY EQUIPMENT

1. SEARCHLIGHTS

The Red Army uses searchlights varying from 400-mm. to 1,500-mm. in diameter. The Sperry truck-mounted 1,500-mm. type is the most frequently used. The lamp of the 1,500-mm. searchlight consists of an open aluminum casing, in which the glass reflector of 1,500-mm. diameter is fixed, with a central aperture for moving the lamp, the base of which is fixed in the control part of the casing. The light is controlled manually by means of an extended shaft. There is no indication that any type of remote control is used with the light. Sound locator stations are used in conjunction with the searchlights to detect and illuminate "unseen" targets. The use of radar-directed searohlights is limited because of the shortage of radar instruments. Consequently, obsolescent sound-ranging equipment is used in conjunction with searchlights. The searchlights do not appear as powerful as, or to have the range of, United States models.

a. 1,500-mm. searchlight 0–15–2. The 0–15–2 (fig. 44) has no casing of protective glass.

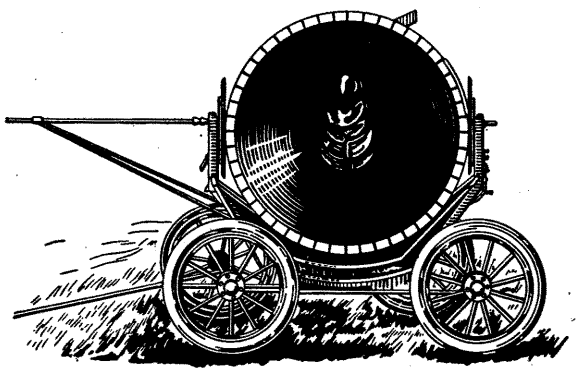


Figure 44. O–15–2 searchlight.

It is mounted on a four-wheeled chassis. A twin-axled 3-ton truck is used as transport. The instrument is loaded and unloaded from the truck by means of guide rails. Ignition and carbon feeding is accomplished by hand, and the searchlight can be operated either from the truck or from the ground. A generator, with an output of 20 kilowatts at 2,000 revolutions per minute, supplies the current.

b. 1,500-mm. searchlight S–15–4A. The S–15–4A (fig. 45) corresponds in construction to the 1,500-mm. 0–15–2. It has, however, a casing and protective glass. Ignition is carried out automatically and the operation is either by extended shaft or by remote control.

CHARACTERISTICS

Power	700 million candlepower.
Range	6,600 to 7,600 yards.
Load	150 amperes: 70 to 80 volts.

c. 1,500-mm. searchlight S–15–4B. The S–15–4B is believed to be an improvement on the 1,500-mm. S–15–4A.

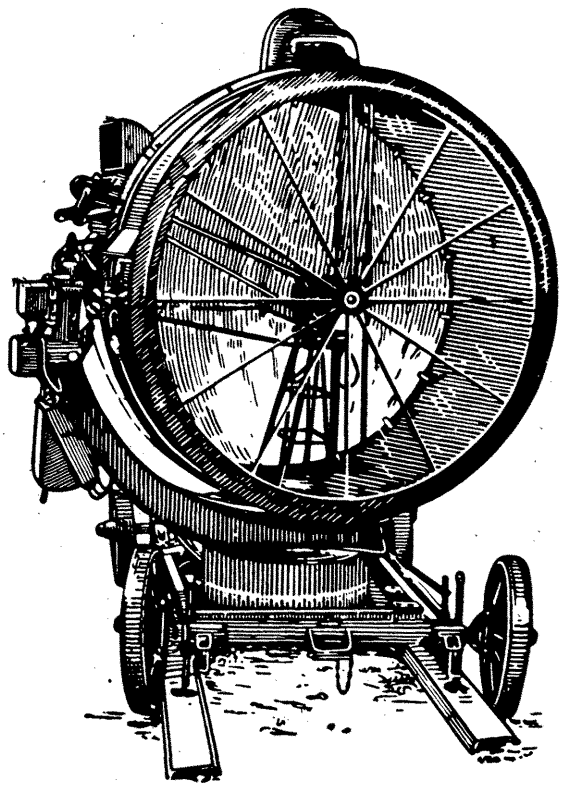


Figure 45. S–15–4A searchlight.

d. 1,500-mm. searchlight PO–15–8. The 1,500-mm. PO–15–8 (fig. 46) is mounted on a triple-axled 4-ton ZIS–6 truck. It can be loaded or unloaded by means of an electrically controlled winch and guide rails. The inverted high-powered lamp is housed in a half-opened casing.

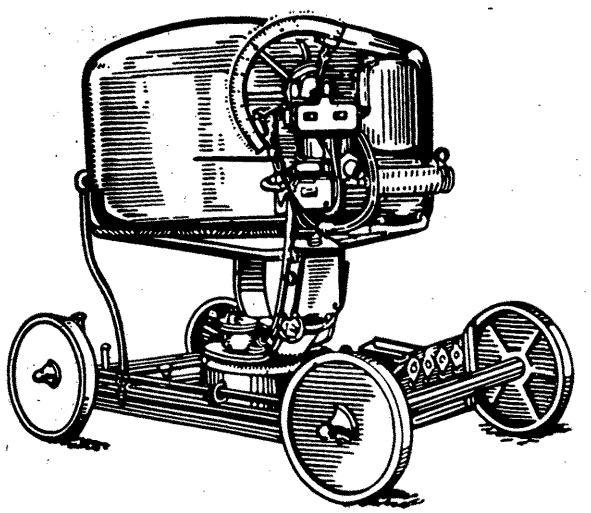


Figure 46. PO–15–8 searchlight.

e. 1,500-mm. searchlight S–15–3. The S–15–3 is obsolete and is employed only in a static role. The generator output is 20 kilowatts.

CHARACTERISTICS

Power	900 million candlepower.
Range	9,800 yards.

f. 1,200-mm. searchlight S–14–4. The S–14–4 is truck-mounted.

g. 1,000-mm. Kaganovich. The Kaganovich uses 150 amperes at 78 volts.

h. 750-mm. searchlight. It is believed that a 750-mm. searchlight also is used.

2. MISCELLANEOUS

a. Goerz panoramic camera. A Goerz panoramic camera is used in preparing flash ranging mosaics. It has a focal length of 240 and 420 millimeters and an adjustable lens. A wide panorama of 132° can be obtained.

b. Ordinary cameras. Ordinary cameras, mounted on battery commanders scissors telescopes or on field glasses, have been used to prepare mosaics. The Zeiss periscopic and Zeiss photo theodolite also are used.

c. FED (ФЕД) camera. The FED camera is a direct copy of the German Leica. It is one of the standard Soviet-made miniature cameras. Size is 35 millimeters. It is equipped with an anastigmatic lens with a focal length of 50 millimeters, and has an exposure range to 1/1500 second.

CHARACTERISTICS

Dimensions	5.2×2.16×1.2 inches.
Weight	1.2 pounds.

d. Short focal length camera. A short focal length camera, fitted with stereo equipment, also is in use.

e. Gunner's quadrant. This 1896 instrument (fig. 47), which is graduated in degrees, is obsolete. Principal components are as follows:

(1) Scale,
(2) Arm with level and vernier,
(3) Pivot,
(4) Micrometric screw.

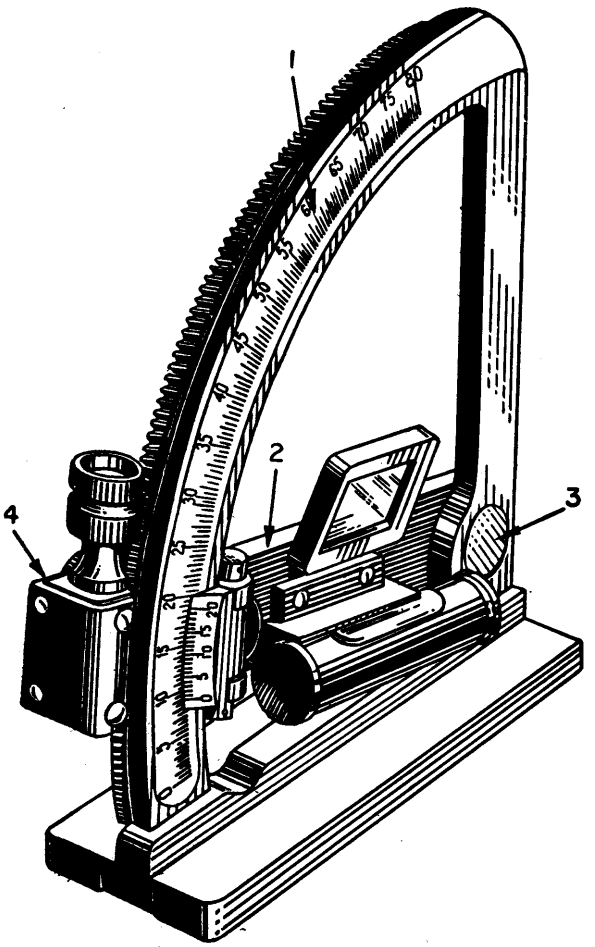


Figure 47. Gunner's quadrant.

f. Gottlieb graphical firing table. This device (fig. 48) is used to compute the total correction in elevation, barometric pressure, charge temperature, and wind. A different version is used for each type of gun and each type of ammunition. On the reverse side of each table is a graph for wind direction and angle-of-site corrections.

g. Autocorrector M1932. The autocorrector (fig. 49) provides a simple and rapid method for computing deflection and range corrections on the basis of aerial observation.

Principal components are as follows:

(1) Body,
(2) Azimuth circle,
(3) Coordinate scale model 1931,
(4) Lateral correction graph.

h. PUO–32 fire control instrument. The PUO–32 (fig. 50) has a scale graduated into 10-mil divisions and a vernier graduated in mils. This instrument is used:

For target designation from base line,
To transform data for target designation,
To determine initial data for firing,
For K-transfer,
To determine data for converging or dispersed fire of battalion (or group),
For transfer of fire from check points,
To compute ballistic and meteorological corrections.

Principal components are as follows:

(1) Triangle,
(2) Hinged rulers,
(3) Hinged rulers,
(4) Hinged rulers,
(5) Fixed ruler,
(6) Pivot,
(7) Outer scale in mils,
(8) Inner scale in mils,
(9) Vernier scale,
(10) Eccentric screw with vernier scale,
(11) Slot and celluloid plate with index line,
(12) Straightedge,
(13) Topographic range scale 1/25,000 in kilometers,
(14) Sight graduation graph in single sight units at 1/25,000 scale,
(15) Index slide,
(16) Position pointer,
(17) Outer scale clamp screw,
(18) Inner scale clamping screw,
(19) Pantograph pin.

i. TS–2 Theodolite. The TS–2 theodolite is used as fire-control equipment. (For details, see sec. VII, pt. IV.)

j. M1934 fan protractor. See figure 51.

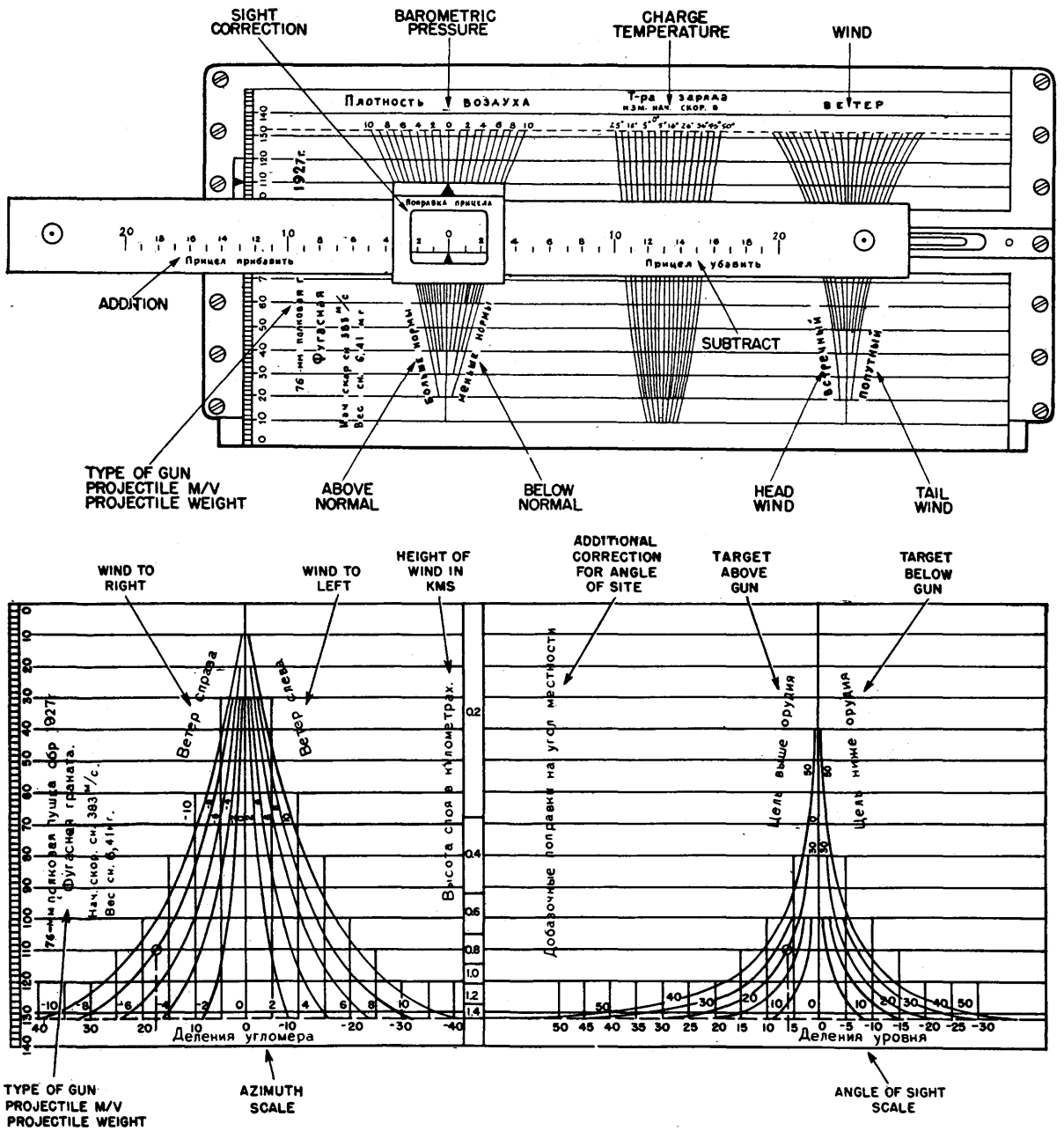


Figure 48. Gottlieb graphical firing table.

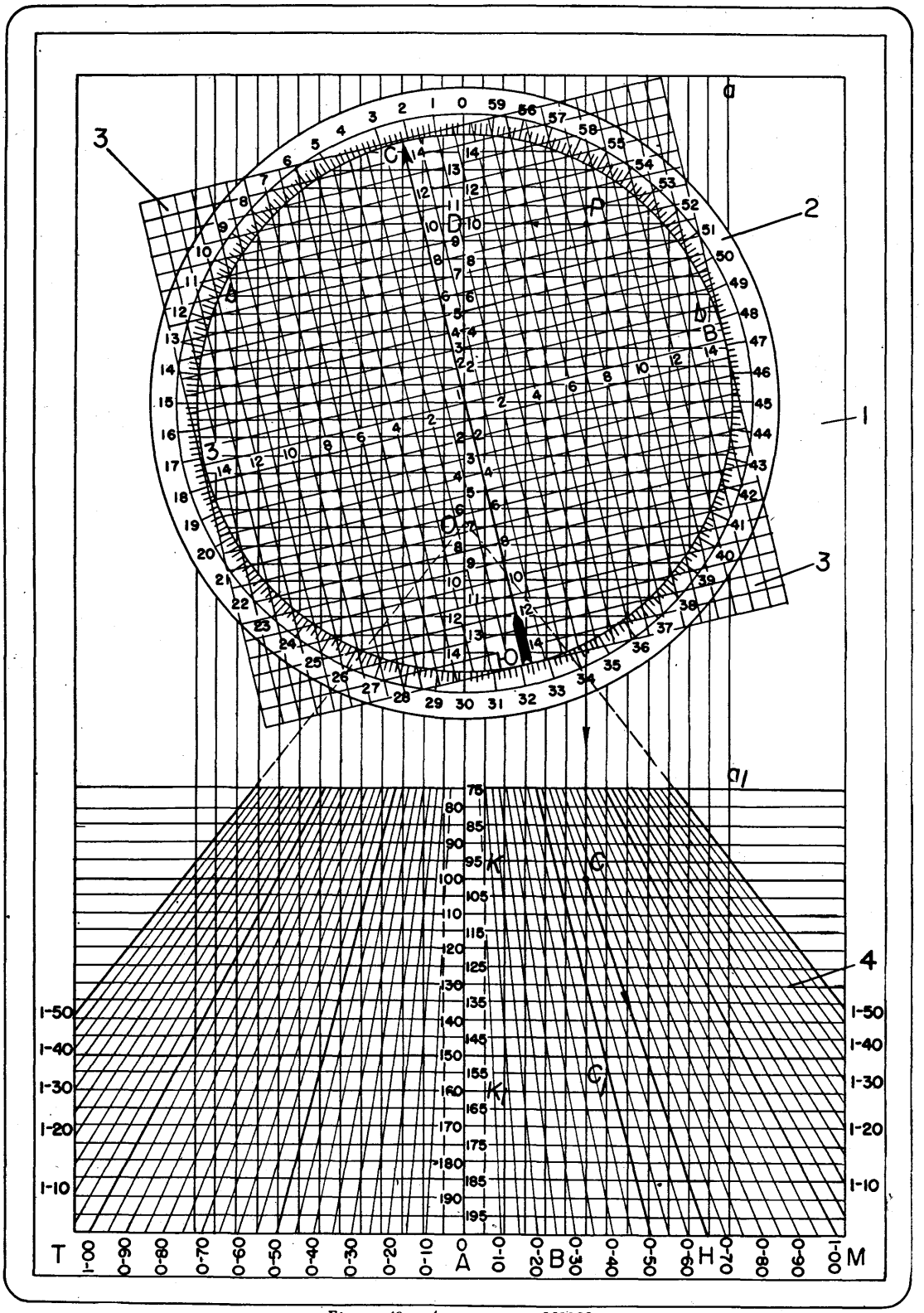


Figure 49. Autocorrector M1932.

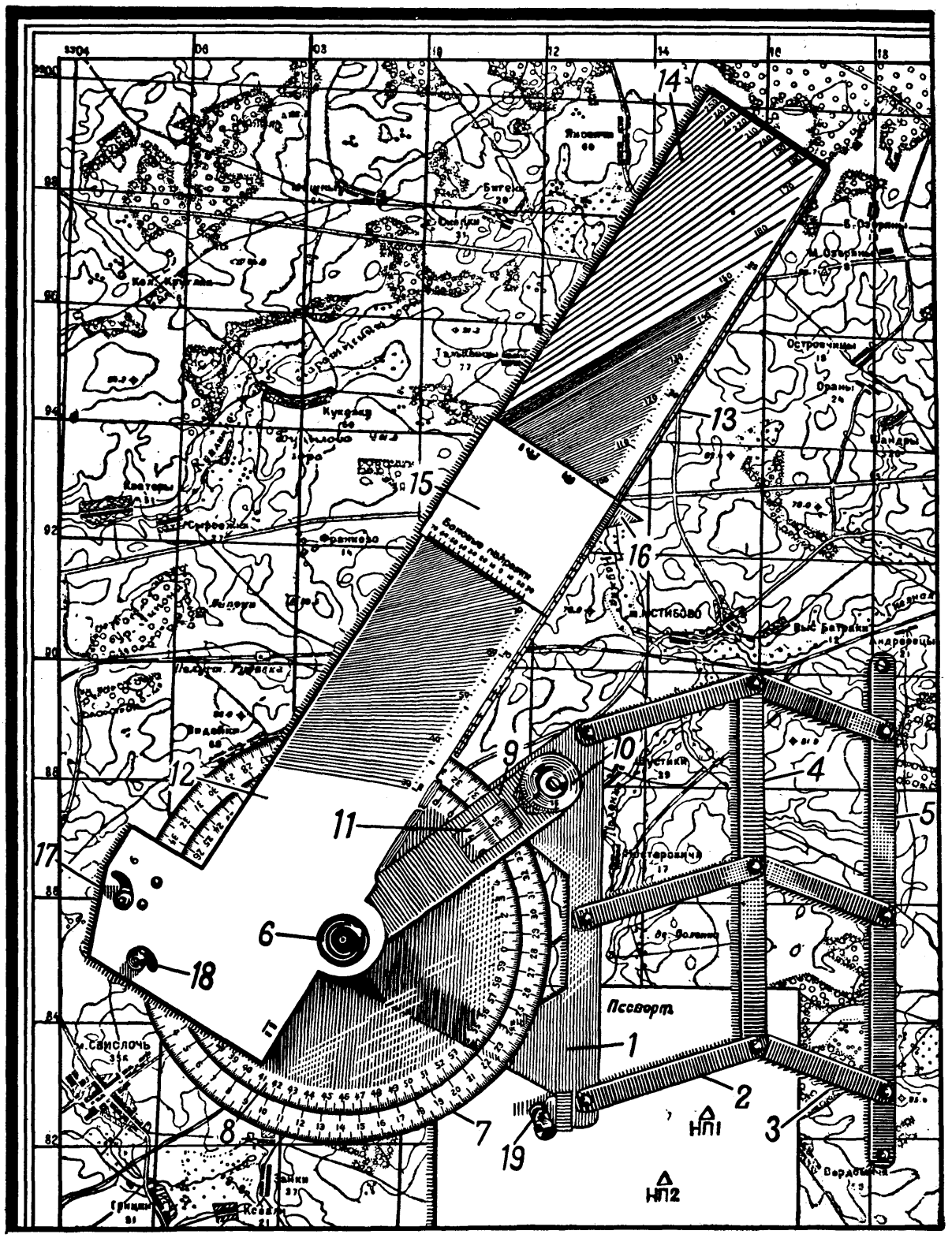


Figure 50. PUO–32 fire-control instrument.

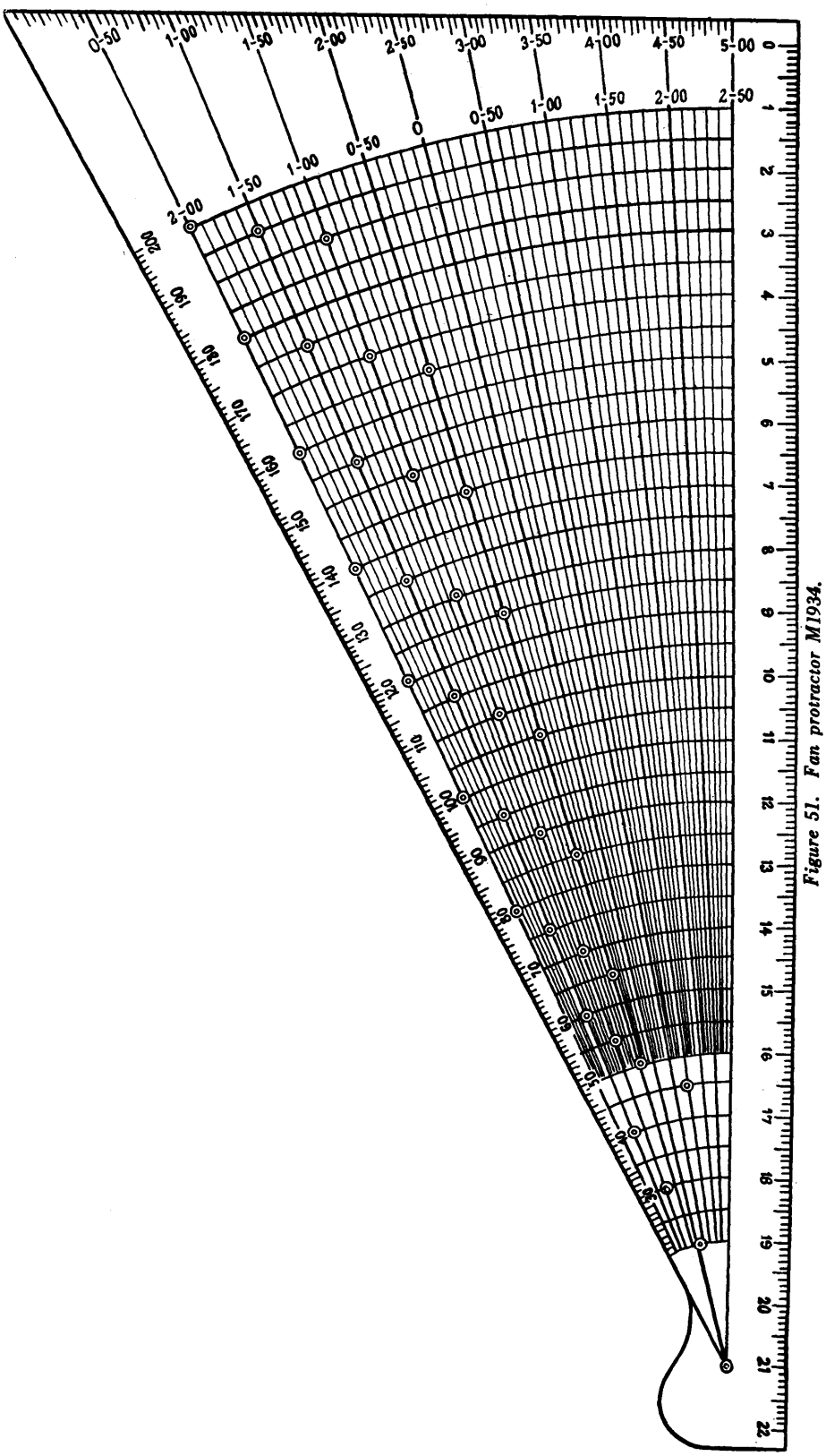


Figure 51. Fan protractor M1934.

Section V. MORTAR FIRE CONTROL EQUIPMENT

1. FIRE–CONTROL DEVICES

Red Army mortar sights function similarly to those of the United States. Small range finders are used in fire control of Soviet mortars.

2. TYPES OF SIGHTS

The Red Army has developed several mortar sights (figs. 52 through 62), many of which are little more than simple open iron sights mounted on azimuth circles. The sights permit parallel laying in battery.

No Soviet mortar sight has been reported employing the back sighting principle of the United States M6. This device allows the placing of aiming stakes to the rear of the piece.

Sight	Type	Weapons on which employed	Remarks
		37-mm. spade	Mortar laid by sighting over tube.
50-mm. type 1 [1]	Iron sight and azimuth scale	50-mm	No comparable United States device. Can be used in mortar battery in conjunction with aiming circle.
50-mm. type 2 [1]	Open sight with azimuth micrometer.	50-mm	Built by Germans for use with all Soviet 50-mm. mortars.
50-mm. M1941	Sight with azimuth circle	50-mm. M1941	Believed to be a later version of 50-mm. type 1.
MP–1	Telescopic sight	82-mm 107-mm 120-mm (?) [2] 160-mm. (?) [2]	Similar to United States M34. Believed to be employed on all larger caliber mortars because with telescopic sights the mil error is reduced.
MP–41	Optical sight	82-mm	Similar in principle to United States M4.
MP–82	Refined optical type (non-telescopic).	82-mm	Similar to United States M6.
MPB–82 M41	Similar to machine gun type azimuth circle.	82-mm	No comparable United States device. Combines features of machine gun type azimuth circle and 50-mm. type 1.
MPB–82 M43	do	82-mm	Same as MPB–82 M41.
MP–82 YC	Collimator and azimuth circle	120-mm 107-mm. (?) [2] 160-mm. (?) [2]	Appears to be a refined version of MP–82. Similar to United States M6.
Azimuth circle	Machine gun type	82-mm	No similar United States device. Similar to 50-mm. type 1, but with elevation adjustment.
Unknown	Believed to be telescopic	160-mm	Believed to be similar to United States M34 and to MP–1.

[1] Arbitrary designation.
[2] Sight believed to be employed with these weapons. Not confirmed.

Figure 52. Characteristics of Red Army mortar sights.

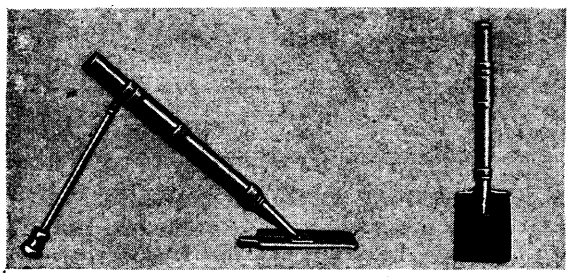


Figure 53. 37-mm. spade mortar laid by sighting over tube.

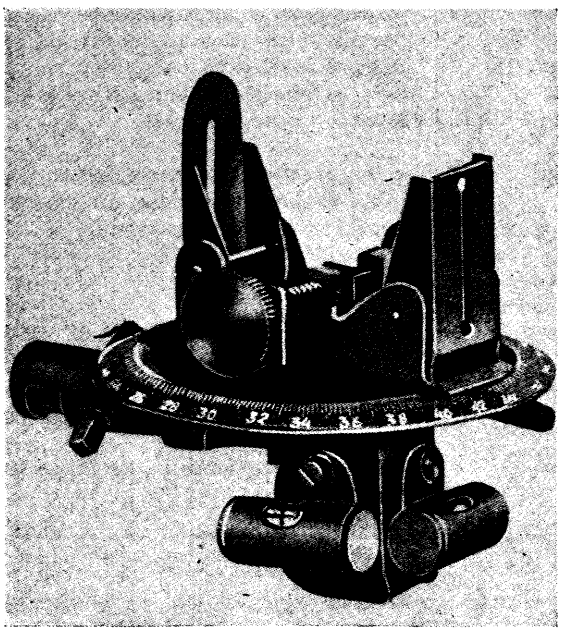


Figure 54. 50-mm. mortar sight type 1.

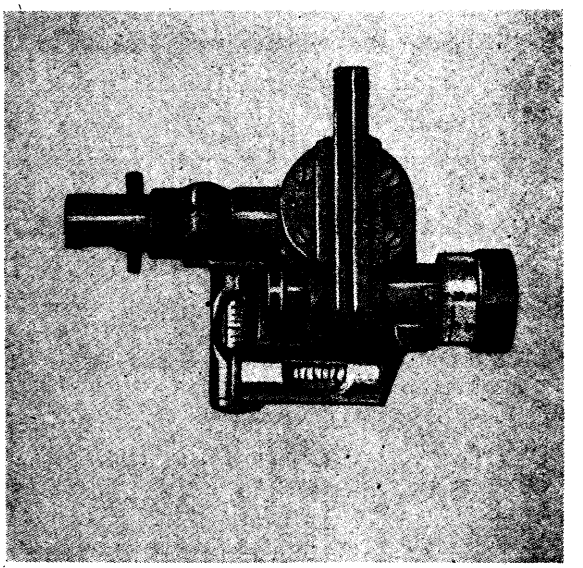


Figure 55. 50-mm. mortar sight type 2 (German-built).

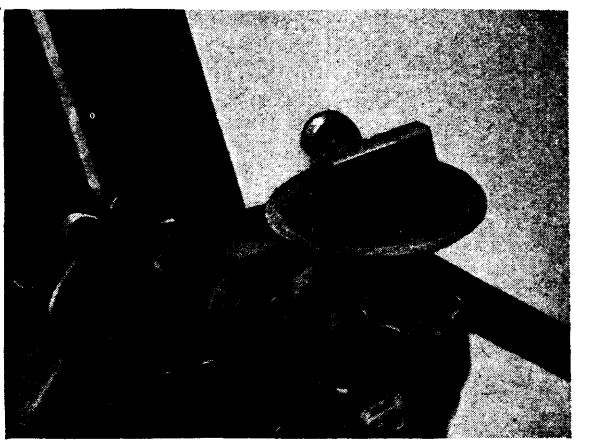


Figure 56. 50-mm. mortar sight M1941.

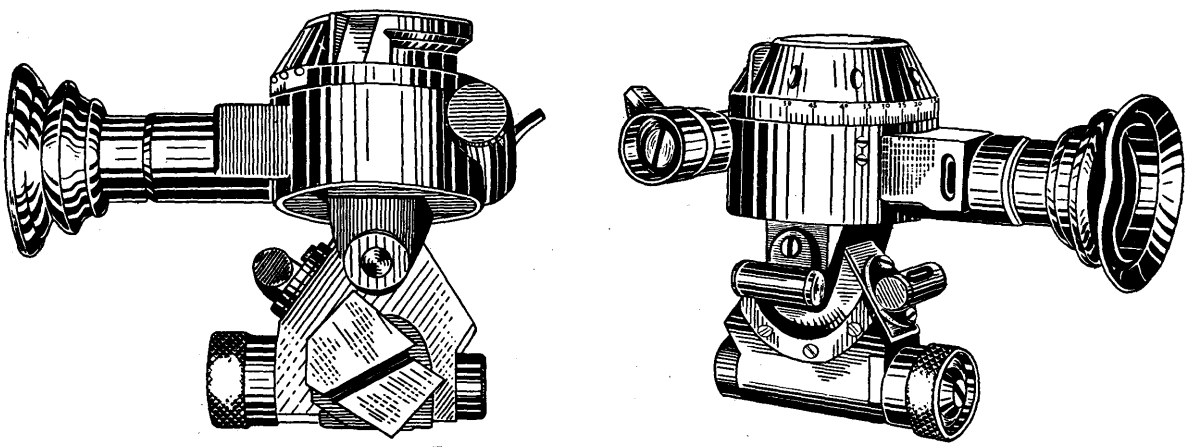


Figure 57. Mortar sight MP–1.

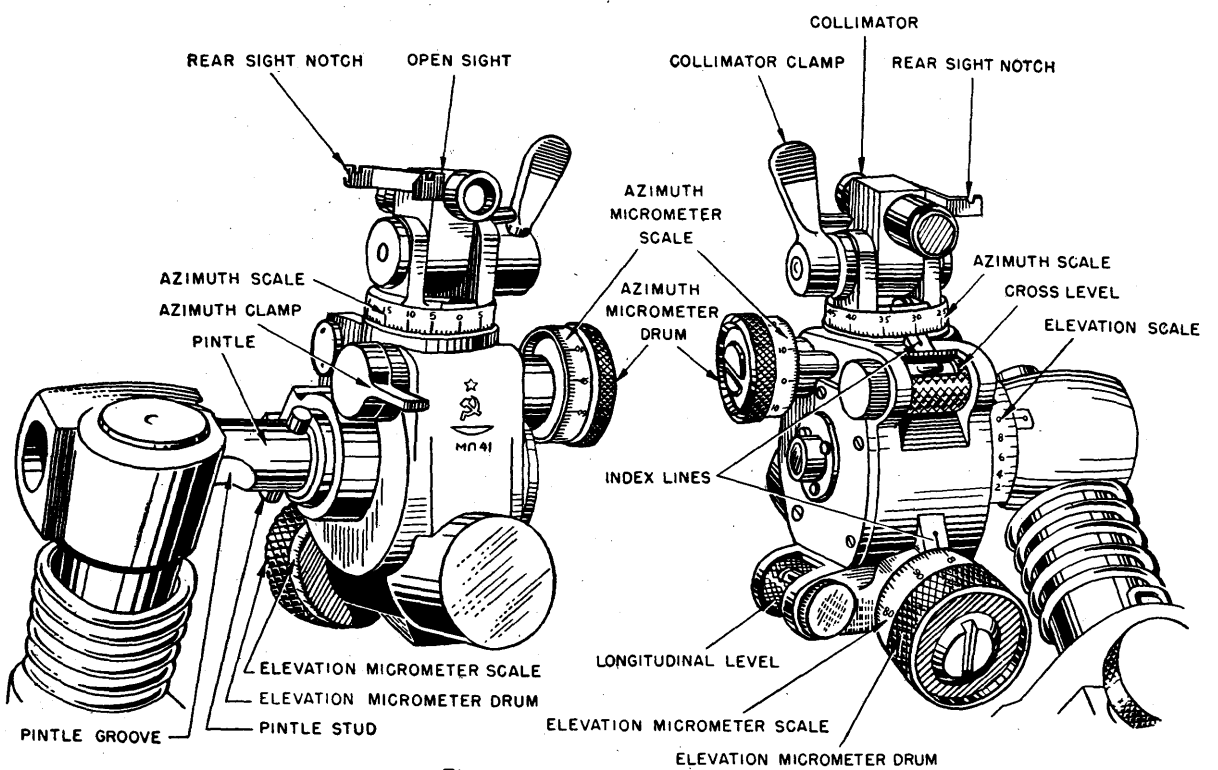
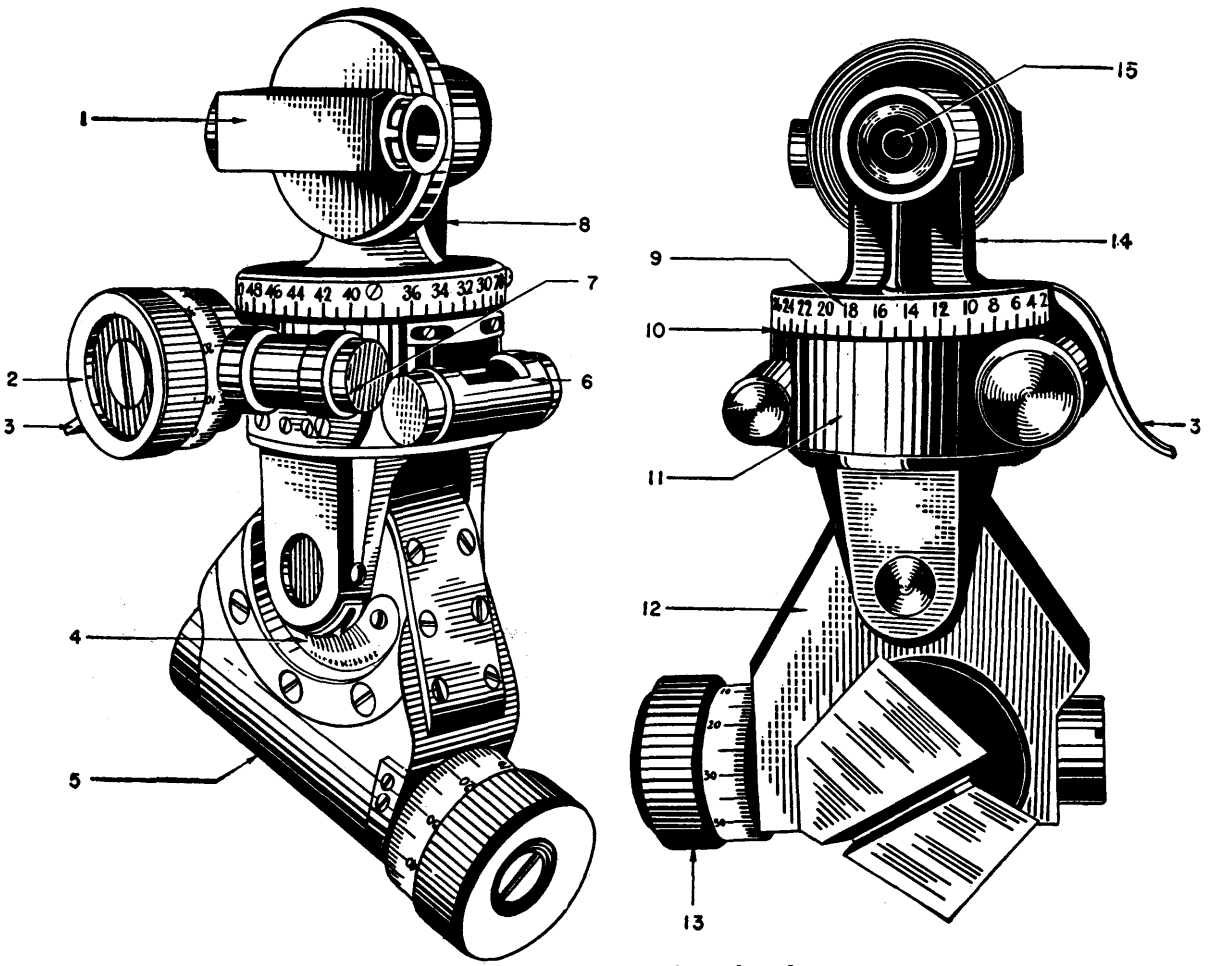


Figure 58. Mortar sight MP–41.



1. Collimator
2. Azimuth knob
3. Azimuth throw-out lever
4. Elevation scale
5. Elevation gear housing
6. Cross level
7. Longitudinal level
8. Collimator base
9. Azimuth scale
10. Azimuth index
11. Azimuth gear housing
12. Body
13. Elevation knob
14. Collimator body
15. Collimator pivot

Figure 59. Mortar sight MP–82.

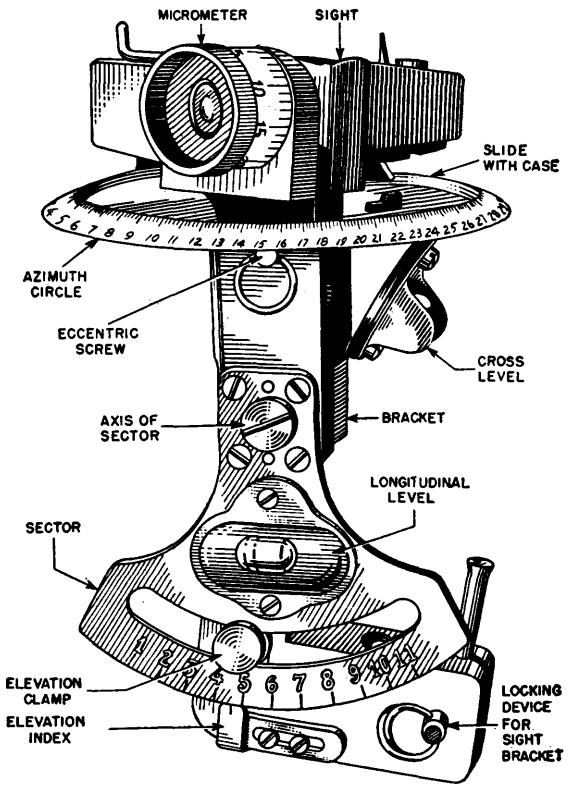
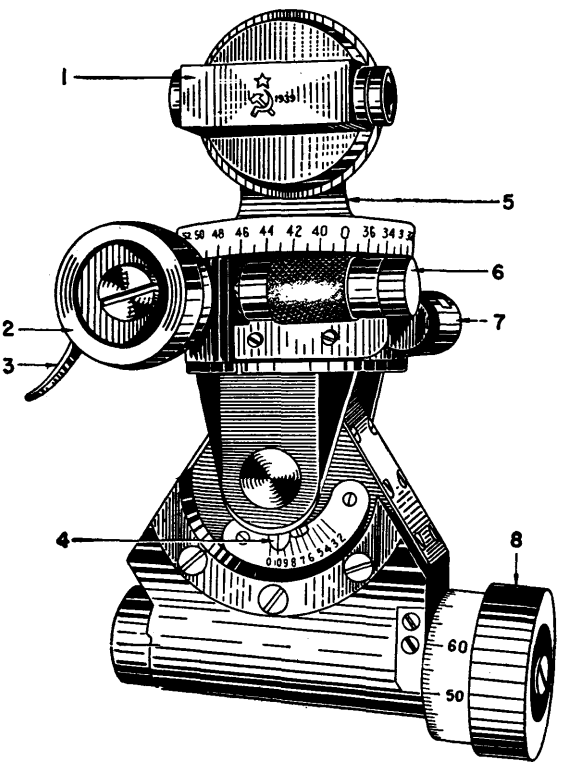


Figure 60. Mortar sight MPB–82.



1. Collimator
2. Azimuth knob
3. Azimuth throw-out lever
4. Elevation scale
5. Collimator base
6. Longitudinal level
7. Cross level
8. Elevation knob

Figure 61. Mortar sight MP–82 YC.

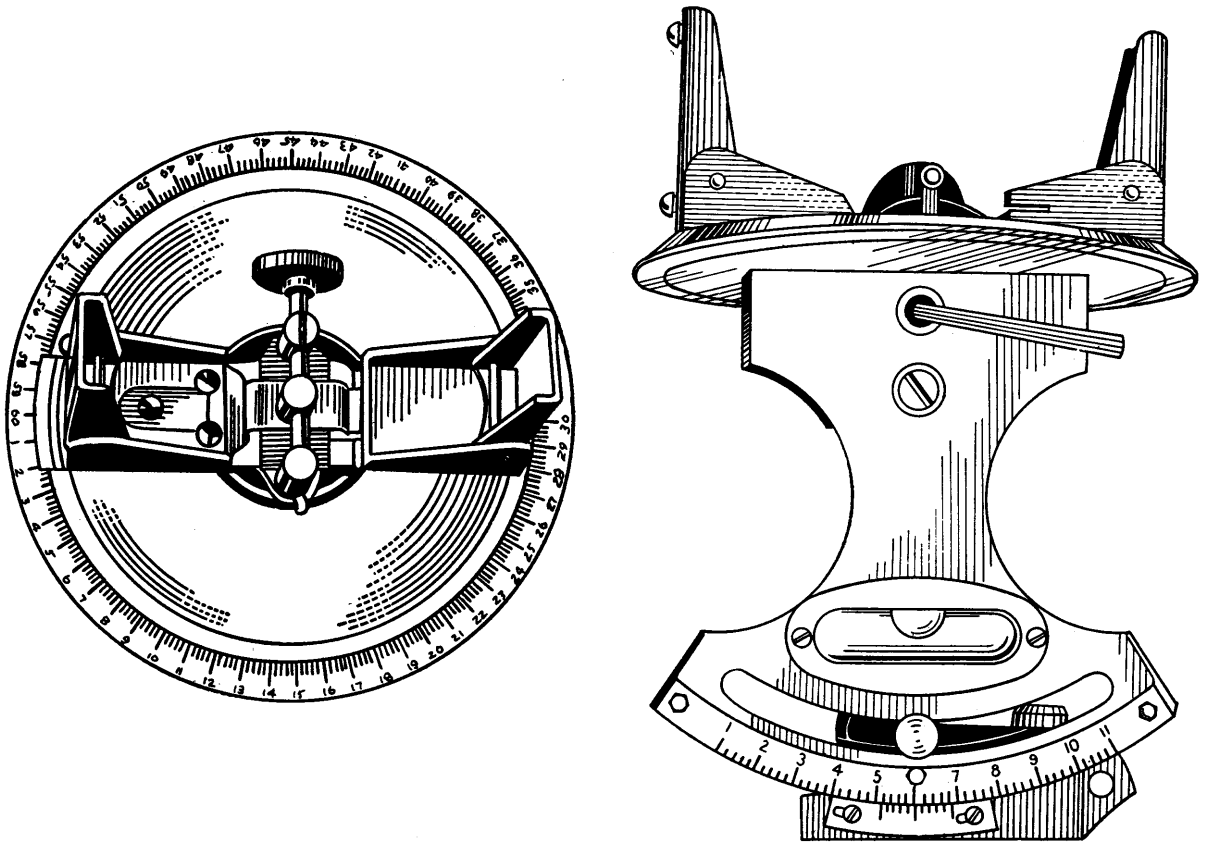


Figure 62. Machine gun type azimuth circle mortar sight.

PART III. SIGNAL COMMUNICATIONS EQUIPMENT

The following material is based on information available in early 1946. Additional information will be published in supplements to follow.

Section I. GENERAL

1. SOVIET EQUIPMENT

Signal communications equipment manufactured in the U. S. S. R. appears to be of old design. Most items were developed in, or copied from, Western Europe and the United States. However, the best and latest Soviet radio equipment is completely modern, but old types of equipment are used side by side with modern, efficient equipment. The U. S. S. R. attempted to standardize signal equipment during the 1930's to increase production, simplify training, and ease maintenance problems. However, the electrical industry produced equipment barely sufficient to meet the needs of the Red Army when World War II began. Coupled with the severe losses inflicted by the Germans, this meant that Soviet communications were inadequate by Western standards and remained so throughout World War II.

2. IMPORTED EQUIPMENT

The shortages in equipment were greatly alleviated by large shipments of all types of equipment from Great Britain and under Lend-Lease from the United States. The United States, alone, supplied nearly 400,000 field telephones, nearly 1,000,000 miles of field telephone wire, and more than 40,000 radio sets. It is believed that in October 1945, at least 30 percent of Red Army signal equipment consisted of standard United States and British matériel. Major items of United States lend-lease signal equipment delivered to the U. S. S. R. through 30 June 1945 are as follows:

Nomenclature	Item
M5	Director.
M7 and M7A1	Do.
M9	Do.
M10	Do.
SCR 177B	Radio set.
SCR 206	Radio compass.
SCR 210	Radio set.
SCR 244	Do.
SCR 245	Do.
SCR 268	Do.
SCR 269	Radio compass.
SCR 270	Radio set.
SCR 271	Do.
SCR 274	Do.
SCR 277	Do.
SCR 284	Do.
SCR 287	Do.
SCR 299	Do.
SCR 300	Do.
SCR 399	Do.
SCR 499	Do.
SCR 508	Do.
SCR 511	Do.
SCR 518	Do.
SCR 527	Do.
SCR 536	Do.
SCR 551	Do.
SCR 584	Do.
SCR 587	Do.
SCR 545	Do.
SCR 547	Do.
SCR 602T	Do.
SCR 610	Do.
SCR 625	Detector set.
SCR 627	Radio set.
SCR 682	Do.
SCR 695	Do.
SCR 717B	Do.
SCR 718	Do.
SCR 720	Do.
AN/APQ–58	Do.
AN/APR–1	Radio receiver.
AN/TPS–3	Radio set.
AN/TPX–3	Do.
AN/TTQ–1	Operations center.
AN/MPM–15	Radar test set.
EE–8	Telephone.
EE–108	Do.
EE–105	Telephone unit.
EE–97	Teletypewriter.
EE–97A	Do.
BD–72	Switchboard.
TC–4	Telephone central office set.
PBX	Dial telephone central.
RC–53A	Interphone equipment.
RC–58	Facsimile equipment.
RC–61	Interphone equipment.
RC–120	Facsimile equipment.
RC–145	Radio equipment.
RC–350	Do.
RC–351	Do.
W–110	Field wire.
WS–1/TS	Cable.
BSA 22G Cable 11 Pr	Do.
Terminal Cable	Do.
RCLC #2	Do.
WC–369	Do.
BC 779	Radio receiver.
SX 28	Do.
SX 28 SC Type R–45/ARR–7	Do.
HRO SC Type R–120/FSM–1	Do.
NC–100–ASC Type AN/GRR–3	Do.
BC 453	Do.
BC 454	Do.
BC 455	Do.
RHT	Triple diversity receiver.
BC 1016	Inked tape recorder.
BC 1031	Panoramic adapter.
MN 26	Radio compass.
PH–330–G	Motion picture camera.
BC 442	Relay unit.
BC 450	Radio control box.

(For additional radar equipment, see chapter XI, Air Forces.)

In addition to the above listed Signal Corps items, the U. S. S. R. also was furnished more than 5,000,000 standard radio tubes, all types of test equipment, batteries, power supplies, antenna systems, keys, headphones, microphones, photographic films, and other miscellaneous accessories through Lend-Lease.

Section II. RADIO EQUIPMENT

1. GROUND

Most ground equipment is of design current during the middle 1930's. It is of rugged construction, although often poorly finished. Because standardization never was achieved, many different models (figs. 63 and 64) were issued. Frequently, only a few of each type were manufactured. Soviet sets are roughly comparable to Japanese equipment. Little thought is given to reduction of weight or compactness. Consequently, sets often are difficult to handle and to operate. Exceptions are later models, smaller sets for battalions and companies. They are lightweight and are of good quality. Equipment developed during World War II is of good design and modern construction, probably because of the great influx of foreign equipment.

Nomenclature	Frequency range (megacycles per second)	Circuit and tubes	Power supply and consumption
Kv	0.2–6 (?)	4—6K7, 1—6L7, 1—1H6, 1—6I7, 1—1F5.	
URAL–M	1.5–6		
Receiver used with RB, 3–R and RBK transmitters.	1.5–6	3—SO 241, 1—UB 240, 1—SB 242, 1—SO 243.	Battery (?)
Receiver used with RBM transmitter	1.75–6	5—2K2M, 1—SB 242	Battery
Receiver used with 12–RP transmitter	2–6	2—SO 241, 2—SB 242	Battery
Receiver used with 13–R transmitter	1.75–4.25	1—SB 242, 5—SO 241	Battery
RUK	3.25–5.25	2—SB 112, 3—UB 110	Batteries and/or dynamotor
5–RKU, 5–RKU–2	2.5–10	3—UB 110, 2—SB 147	Generator
Receiver used with RSB–F and (RSMK) transmitters.	0.2–12	4—6K7, 1—6L7, 1—6I7, 1—6F6, 1—6H6.	Battery
Receiver used with 9–R transmitter	4–5+(?)	3—6K7, 1—6A8, 1—6G7, 1—6F6	
Receiver used with 10–R transmitter	3.8–6 (?)	2—6K6, 1—6P7, 2—6K8, 1—6F6	
Receiver used with 71–TK series transmitters.	4–5+(?)	5—UB 110, 2—SB 112	
Receiver used with 6–PK RKR (?)	3.75–5.50	1—SB 112, 3—UB 110	
Receiver used with 3–A	0.4–1.025	3—UB 110	
Receiver used with partisan sever	4.6–12	3—SV 241	
Receiver used with prima	3.325–5	1—SB 242, 1—2K2M, 1—SO 243	
Receiver used with RL–6	1.8–10.5	1—SB 242, 3—2K2M	
Receiver used with RP–3	1.5–5.175	2—KF 1, 1—KC 1	
45–PAK	0.012–30		
45–PK	1.43–20	Superhet; 5—UB 107, 3—SB 112	
45–PK–1	1.43–20	Superhet; 4—SB 154, 5—UB 152	
45–PD			
45–PP			
45–PS			
51–PA	0.075–1.07	3—SB 112, 3—UB 110	Generator
51–PA–1	0.075–1.07	5—UB 110, 3—SB 112	Generator
54–PD	2–3.333	Superhet; 8 tubes	Batteries
55–PK–3 or 55–PK–3A	1.7–15	Superhet; 4—SB 154 (112), 5—UB 152	
55–PK	3–20	7—UB 110	Batteries
55–PK–2	3–20	7 tubes	

Figure 63. Red

Antenna	Dimensions and weight	Allocation	Remarks
.....	.....	Regiment.....	
.....	35 pounds.....	.....	
.....	.....	Regiment, artillery, cavalry.....	
.....	.....	Regiment, artillery regiment.....	
.....	.....	Cavalry, tank, rifle and artillery regiments.	
.....	.....	Company level.....	
.....	.....	Division and regiment.....	
.....	25 x 22 x 18 inches.....	Division, corps and higher.....	Used with 20–KV1 for 5–AK–1M.
		Division, corps.....	
13-foot rod.....	7 x 7 x 10 inches.....	T34 (medium) and T70 (light) tanks..	
13-foot rod.....	.....	T34 (medium) and KV (heavy) tanks..	
4-foot rod.....	15 x 8 x 9 inches.....	Vehicular and tank.....	
Dipole and wire.....	.....	Batallion, artillery battalion.....	
50-foot mast.....	.....	Corps.....	
.....	.....	Agents and guerillas.....	
.....	.....	Air force, ground troops.....	
.....	.....	Artillery regiment.....	
.....	.....	Regiment, battalion.....	
3- to 36-foot masts....	.....	D/F and intercept.....	
.....	1,000 pounds, complete station....	D/F and intercept.....	Has provision for tape recorder.
.....	40 pounds, 18 x 12 x 13 inches....	D/F and intercept.....	Modification of 45–PK. 45–PS is similar.
.....	.....	.....	Existence known.
.....	.....	.....	Existence known.
.....	.....	.....	Existence known.
36-foot masts.....	.....	D/F and intercept.....	Detects 100-watt transmitter at 100 miles within 1–1.5°. Also 51–PA–1.
36-foot masts.....	.....	D/F and intercept.....	Detects 100-watt transmitter at 100 miles within 1–1.5°. Also 51–PA–1.
.....	100 pounds.....	D/F and intercept.....	Detects 100-watt transmitter at 75 miles with 1–2° accuracy.
Adcock.....	1,500 pounds complete station....	D/F and intercept.....	
Adcock.....	400 pounds.....	D/F and intercept.....	2–3° accuracy.
Adcock.....	.....	D/F and intercept.....	To replace 55–PK.

Army radio receivers.

Nomenclature	Frequency range (megacycles per second)	Power output (watts)	Type signal and range (in miles)	Circuit and tubes
I–VF	Transmitter: 0.25–0.75 (#10–30); 4.1–8.5 (#16–34); 11.11–16.6. Receivers: 5 receivers covering 0.012–30.	4,000	CW—2,500, Voice—1,500	
I–VP	0.25–0.75 (#10–30)	4,000	CW—2,500	
I–A	Transmitter: 0.25–0.375 (#10–15); 0.012–1.2 or 0.037–1.5.	2,000	CW—500, Voice—180	
RAT–I	Transmitter: 2.5–12 (#100–480). Receiver: 0.125–12 (#5–480). (3 receivers.)	1,500	CW—1,200, Voice—360; Facsimile Hi-Speed Tg.	Transmitter: 3—UB 186, 2—GKE 150; 2d section, 4—GKE 150, 5—GK 217, 3—GKE 500, 2 Neon tubes SSN—1a. Short wave receiver: 16—SSB 147, 12—UB 107, 4—UB 132. Long wave receiver: 11—UB 107, 1—UB 132. Mike ampl.: 4—UB 107, 4—UB 132.
2–A	0.3–0.5 (#12–20)	1,000	CW—500, Voice—250	
2D	0.3–0.5 (#12–20)	1,000	CW—500, Voice—250	
11–AK, 11–AK–M, 11–AK–I, 11–DA.	Transmitter: 2.5–7.5 (#100–300). Receiver: 2.5–10 (#100–400).	800	CW—450, Voice—250	Transmitter: 2—GD 400, 1—GD 200, 2—M 80, 3—GK 20. Receiver: 2—SSB 147, 3—UB 110.
RAF RAF–KW	Transmitter: 0.25–0.75 (#10–30), 2.5–12, (#100–480). Receiver: 0.175–12 (#7–180). 2.5–12 (#100–480)	500	Middle wave: CW—360, Voice—180. Interwave: CW—600, Voice—360. Short wave: CW—1,200, Voice—600. Simplex, Half-duplex, Hi-Speed Tg.	1—GKE 500, 1—GKE 100, 2—GU 4.
3–A	Transmitter: 0.4–0.75 (#16–30). Receiver: 0.4–1.025 (#16–41).	250	CW—140, Voice—60	Transmitter: 3—GD 200, 3—GK 20. Receiver: 3—SB 147, 3—UB 110. Audio ampl.: 1—UB 132, 1—UB 107.
3–D	0.4–0.75 (#16–30)	250	CW—140, Voice—60	
RSRM	Transmitter: 0.25–1.5 (#10–60) Receiver: 2.5–6 (#100–240).	15–10		2—GKZ 20, 1—GK 20, 1—GU 4.
RL–6	Transmitter: 3.3–5.4 (#132–216). Receiver: 1.8–10.5 (#72–420).	7	CW–10, Voice—5	1—2K2M, 1—SO 257
3–R	1.475–6.025 (#59–240)	5		1—SB 245, 1—2B 258
4–R (RBS–40)	33.25–40.5 (#66–124)	5	Voice—7. Tone call for Tp. work	1—SB 244, 1—UB 240, 1—SO 257, 1—SO 241.
PRIMA	3,325–5 (#133–200)	5	CW—25	Crystal oscillator 1—2P9M
RB, RB–38	1.5–6 (#60–240)	5	Antenna A: CW—7, Voice—4½. Antenna B: CW—15, Voice—10. Antenna C: CW—21. Voice—11. Antenna D: CW—21, Voice—15.	1—UB 240, 3—SB 241, 1—SB 244, 1—SB 243, 1—SB 245, 1—SB 242.
RBK	1.5–6 (#60–240)	5	Station: CW—12, Voice—8. Mobile: CW—8, Voice—5.	1—SB 245, 1—SB 258
3–K				
3–RD				
4–RA	33.25–40.5 (#66–124)		Voice—5	
RB–M, RB–M5	1.75–6 (#70–240)	3	CW— . Voice—2.3	3—SO 257

Figure 64. Red Army radio stations,

Power supply and consumption	Antenna	Dimensions and weight	Allocation	Remarks
Motor generators	100-foot mast		Army group	
			Army group—high command.	
Motor generator	80-foot mast		Army group—high command.	2–A and 2–D are similar.
Motor generator SDN–3,000; BRA–SS; ZR–SS; 2—ARN–SS, 11—5–NKN–60, 1—4–NKN–10, 8—64–NKN–2.25, 5—BAS–80.			Army group—high command, army headquarters, airfields, corps, divisions.	3 vehicles, 1 for transmitter, 1 for receiver, 1 for power supply. 2 short-wave receivers and 1 longwave receiver.
	2 65-foot masts with wire antenna.		Army—high command.	
			Army—high command.	
Motor Generators, RDN–2500; SDN–1,000. Dynamotor RUN–300; 5–NKN–45 or 60–Battery.	Wire. 4 sections 65.4 feet long on 2 masts 65.4 feet high; 32.7 feet long for UHF. Mobile whip.	Transmitter: 45 x 36 x 30 inches. Receiver: 25 x 22 x 18 inches. 5 tons.	Division, corps and above.	Receiver used is 5–RKU–2. Mounted in 2 each. GAS–AA vehicles.
	25-foot mast	2 tons		
Motor generator RDN–1,000; dynamotor SDN–1,000.	50-foot mast		Corps	GAS–AA, 3–D, 4–A, 4–D, 21–A, 22–T, and 23–T are all similar. Receiver 5–RSU. Frequency meter DW–2.
			Corps—Army headquarters.	
Generator		17 x 12 x 7 inches. 40 pounds.	Artillery	
Batteries		14 x 11 x 12 inches. 30 pounds.	Artillery regiment	
Hand generator	6-foot rod	14 x 8 x 10 inches. 60 pounds.	Division, regiment, battalion.	Similar to 3–RD, 3–K, RB, and RBK.
Filament; 2 volts—2–NKN–10; plate, 120 volts—2 each BAS–60; filament batteries—20 hours. Plate batteries—40 hours.	Rod and umbrella	15 x 18 x 8 inches. 40 pounds.	Artillery regiment, infantry battalion.	Transceiver 1-man pack.
Hand generator	Wire	17 x 15 x 10 inches	Air forces(?), ground troops.	
Filament, 2 volts—2–NKN–22; plate, 240 volts—, 4 each BAS–60 #3. 6-hour operation on transmitter; 20-hour operation on receiver.	Antenna A: 5.6-foot rod with umbrella. Antenna B: 16.4-foot rod. Antenna C: 3.3-foot dipole; mast 65.4-foot–111.1 feet. Antenna D: 26.2-foot rod with 1.6-foot high counterpoise, 4 pieces, 49.1 feet long.	12 x 8 x 7 inches. 70 pounds.	Rifle and artillery regiments, divisions.	2-man pack.
Filament, 2 volts—2–NKN–22; plate, 240 volts—4 each. BAS–60. 6-hour operation on transmitter; 20-hour operation on receiver.	6.5-foot rod on horseback; 22.9-foot rod.	13 x 8 x 7 inches. 40 pounds.	Rifle, cavalry, and artillery regiments.	
				Similar to 3–R.
				Similar to 3–R.
		30 pounds	Artillery regiment, infantry battalion.	
Batteries	Dipole, mast, wire	6 x 17 x 8 inches. 25 pounds.	Rifle and artillery regiments.	

transmitters, and transceivers.

Nomenclature	Frequency range (megacycles per second)	Power output (watts)	Type signal and range (in miles)	Circuit and tubes
12–RP	2.0–6 (#80–240)	2	Antenna A: CW—9.5, Voice—4.5 Antenna B: CW—18, Voice—9. Antenna C: CW—7, Voice—3.5.	1—SO 257, 1—SB 258
13–R	1.75–4.25 (#70–170)	2	CW—18, Voice—12	1—SO 257 MOPA, 1—SO 241 Mod.
13–RA	3.0–5.5 (#120–220)		Voice—8	
RP–3	Transmitter: 1.875–4.4 (#75–176). Receiver: 1.5–5.175 (#60–207).	2		4—TCO3/5POI
21–A				
22–T	0.375–0.75 (#15–30)	250	CW—400 (?), Voice—200 (?)	
12–AK	3.125–4.525 (#125–181)	200	CW—150, Voice—75	
4–A	0.525–1.05 (#21–42)	100	CW—150, Voice—75	
4–D	0.525–1.05 (#21–42)	100	CW—150, Voice—75	
4–D (1931)	0.5–1.65 (#20–66)	100	CW—150	
23–T	0.525–1.05 (#21–42)	100	CW—250, Voice—125	
72–TK	4–5.625 (#160–225)	80	CW—50, Voice—25	
RSB, RSB–F	Transmitter: 2.5–12.0 (#100–480). Receiver: 0.175–12.0 (#7–480).	50	Station: CW—100, Voice—50. Mobile: Voice—18.	Crystal oscillator: 1—UG 4, 1—SK 137.
RSMK	Transmitter: 2.5–12.0 (#100–480). Receiver: 172–12.0 (#7–480).	50	Station: CW—120, Voice—60. Mobile: CW—36, Voice—24.	Crystal oscillator.
Partisan (1)	Transmitter: 4–12 (#160–480). Receiver: 4.6–12 (#162–480).	30–10	CW—350	Crystal oscillator: 1—6P3.
20–KV, 20–KV–1	Transmitter: 3.25–4.75 (#130–190). Receiver: 3.25–5.25 (#130–210). 5 AK 1M (Radio station): 3.0–4.875 (#120–195).	20	CW—60, Voice—30	3—GK 20, 2—UB 110, 3—SB 112.
9–R	Transmitter: 4–5.625 (#160–223). Receiver: 4–5.625 (#160–223).	20	Station: CW—30, Voice—15. Mobile: Voice—10.	2—6V6, 2—6D6.
10–R (KRSTB)	Transmitter: 3.75–6.0 (#150–240). Receiver: 3.75–6.0 (#150–240).	20	Station: CW—40, Voice—25. Mobile: Voice—18.	Crystal oscillator: 2—G4 11.
71–TK, 71–TK–2	4–5.625 (#160–225)	20	CW—40, Voice—20	Crystal oscillator: 3—GK 36, 1—UB 110.
71–TK–1 (1938–39)	Transmitter: 4–5.625 (#160–225). Receiver: 4–5.625 (#160–225).		Station: CW—30, Voice—18. Mobile: Voice—10.	Transmitter: 3—GK 20, 1—UB 110. Receiver: 3—SB 112, 4—UB 110.
71–TK–3 (1940–41)	Transmitter: 4–5.625 (#160–225). Receiver: 4–5.625 (#160–225).		Station: CW—30, Voice—18. Mobile: Voice—10.	
A–7	27–34		Voice—5–6	

Figure 64. Red Army radio stations,

Power supply and consumption	Antenna	Dimensions and weight	Allocation	Remarks
Filament, 2 volts—5–NKN–22; plate, 240 volts, BAS–60 #12. 6-hour operation on transmitter; 20-hour operation on receiver.	Antenna A: 4.9- or 7.2-foot rod. Antenna B: 4.1 inches high dipole of 2 lengths, 39.2 feet to 55.6 feet long. Antenna C: Wire ?.	6 x 17 x 8 inches. 60 pounds	Cavalry, tank, rifle and artillery regiments.	2-man pack.
Filament, 4 batteries 45 or 35 or 1 each NKN–10; plate, 4 batteries, BAS–60 # 3 or #12. Transmitter: Filament, 2.5 volts; plate, 200 volts. Receiver: Filament, 2.5 volts; plate 120 volts.	8.7-foot rod and inverted L 36/9.8 feet.	20 x 15 x 10 inches. 50 pounds	Company level	
		45 pounds	Company level	
Dynamotor		15 x 13 x 9 inches. 25 pounds	Regiment, battalion	
				Similar to 3–A.
			Cavalry corps	
			Division (?)	
			Division	
			Division, corps	
			Infantry division	
			Cavalry	Similar to 3–A.
			Armored units	
Generator GS–1000; dynamotor RUN–75A, RUN–225 or RUN–300. Receiver plate: RU–11. Batteries: 5–NKN–60 or –100.	32.7-foot mast rod with umbrella for mobile.		Division corps, NKVD	Mounted in vehicle GAS–AAA.
Motor BM–3; generator GS–1000; Transmitter dynamotor RUN–K–450; receiver dynamotor RUN–10–A. 4 each 5–NKN–100.	Station: 32.7 foot rod. Mobile: 13-foot rod.	Transmitter: 12 x 8 x 8 inches. Receiver: 15 x 8 x 9 inches. 75 pounds.	Vehicular tank	
Hand generator		16 x 16 x 6. 60 pounds	Agents and guerillas	
Transmitter and receiver filament: 5–NKN–45 or 60 (5.6V). Transmitter plate: dynamotor RUN–75 (750v). Receiver plate: 2—BAS–80 (160v.).	18.3-foot mast with umbrella masts on vehicle.	250 pounds: transmitter-receiver: 20.4 x 13.5 x 10.1 inches. Power case: 18.7 x 13.8 x 8.6 inches.	Division regiment	See 5–AK–1M.
Transmitter and receiver filament: 12 volts. Transmitter dynamotor, RUN–30. Receiver dynamotor, RUN–10.	13-foot rod	Transmitter: 7 x 7 x 9 inches. Receiver: 7 x 7 x 10 inches. 75 pounds.	T34 (medium) and T70 (light) tanks.	
Transmitter and receiver filament: 12 volts. Transmitter dynamotor, RU–75. Receiver dynamotor RUN–10 or RU–11. Current drain: transmitter 15A; receiver 5A.	13-foot rod	18 x 15 x 10 inches. 100 pounds.	T34 (medium) and KV (heavy) tanks.	
Batteries, dynamotor	4-foot rod	Transmitter: 12 x 8 x 8 inches. Receiver: 15 x 8 x 9 inches. 75 pounds.	Vehicular tank	
Transmitter: filament 5.6 volts from battery "B"; plate, 750 volts from dynamotor RUN–75 (RM–2). Receiver: filament, 4 volts from 4–NKN–10; plate, 160 volts from 2 plate batteries.	13-foot rod	Transmitter: 14 x 9.9 x 9.1 inches. 45 pounds. Receiver: 16.7 x 9.75 x 8.9 inches; 35 pounds.	Vehicles and tanks	
Transmitter: filament, 5.6 volts. Plate, 750 volts from dynamotor RUN–75 (RM–2). Receiver: filament 4 volts from 4–NKN–10. Plate, 160 volts from RUN–10.	13-foot rod	Transmitter: 14 x 9.9 x 9.1 inches; 45 pounds. Receiver: 16.7 x 9.75 x 8.9 inches; 35 pounds.	Vehicles and tanks	
		45 pounds	Division, artillery. Possibly air-ground.	

transmitters, and transceivers—Continued.

Nomenclature	Frequency range (megacycles per second)	Power output (watts)	Type signal and range (in miles)	Circuit and tubes
A–7–A	27–32; 101 channels	1	Voice—4½–6, Telephone—1½	1—SO257, 8—2K2M
6–PK (RKRM)	Transmitter: 3.75–5.25 (#150–210). Receiver: 3.75–5.5 (#150–220).	0.66	Antenna A: CW—9.5; Voice—4.5. Antenna B: Station, CW—4.5–6; Voice—2.5–3; Mobile, Voice—1.8.	7—UB110, 1—SB112
6–PK–D				
6–PK–1	3.75–5.25 (#150–210)	0.66	CW—10, Voice—5	Crystal oscillator
RRS	32.4–36.8 (#66–80(?))	0.07 or 0.7 (?)	MCW— , Voice—⅓	1—UB240
RRU	33.–40 (#66–124)	0.2	Voice—Line of sight up to 3 miles	1—UB132, 1—UB107
NORTH	Transmitter: 1.3–2.9 (#52–116). Receiver: 0.75–3.5 (#30–140).		CW—280, Voice—150	
5–TK–2	3.25–4.875 (#130–195)		CW—50, Voice—	
13–R				
RBS–1				
V–100				
RKR	Transmitter: 3.75–5.25 (#150–210). 3.75–5.5 (#150–220).		CW—12–15, Voice—	5—UB110, 1—UB107, 1—UB132, 1—SB112.

Figure 64. Red Army radio stations,

Power supply and consumption	Antenna	Dimensions and weight	Allocation	Remarks
2–BAS–80, plate; 2–NKN–10, filament. Transmitter: Plate 160 volts at 25–30 milliamperes; filament, 2.4 volts at 0.35 amperes. Receiver: Plate, 160 volts at 10–12 milliamperes; filament, 2.4 volts at 0.42 amperes.	16.4-foot rod with umbrella and 3-wire counterpoise.	10.3 x 16.4 x 14 inches. 50 pounds.	Rifle regiment, artillery battalion.	
Filament, 4 volts, 4–NKN–10; plate, 160 volts, 2 each BAS–80; 20–30-hour operation.	Antenna A: Dipole 3.3 feet high, 98.1 feet long. Antenna B: 4.9-foot rod with umbrella.	20 x 24 x 16 inches. 48 pounds.	Infantry and artillery battalion.	2-man pack.
.....	.....	.....	.....	Similar to 6–PK.
.....	.....	.....	Regiment, battalion, company.	
Batteries.....	Rod.....	7 x 10 x 3 inches. 10 pounds...	Short distance signaling.	
Filament, 2 volts, 4–NKN–2.25; plate, 180 volts, 3 each BAS–60. Filament battery, 8 hours; plate battery, 20 hours.	5-foot rod.....	8 x 5 x 12 inches. 18 pounds...	Company, artillery, battery.	1-man pack.
.....	.....	.....	Division and above....	
.....	.....	.....	Division, regiment, battalion.	
.....	.....	.....	.....	
.....	.....	.....	.....	Existence verified.
.....	.....	.....	.....	Existence verified.
Filament, 4 volts, 4–NKN–10; plate, 160 volts, 2 each BAS–80; 25–30 hours of operation.	15.7-foot rod on horseback; 49.1-foot counterpoise.	Transmitter-receiver: 25 pounds. Battery case: 25 pounds.	.....	Horse pack.

transmitters, and transceivers—Continued.

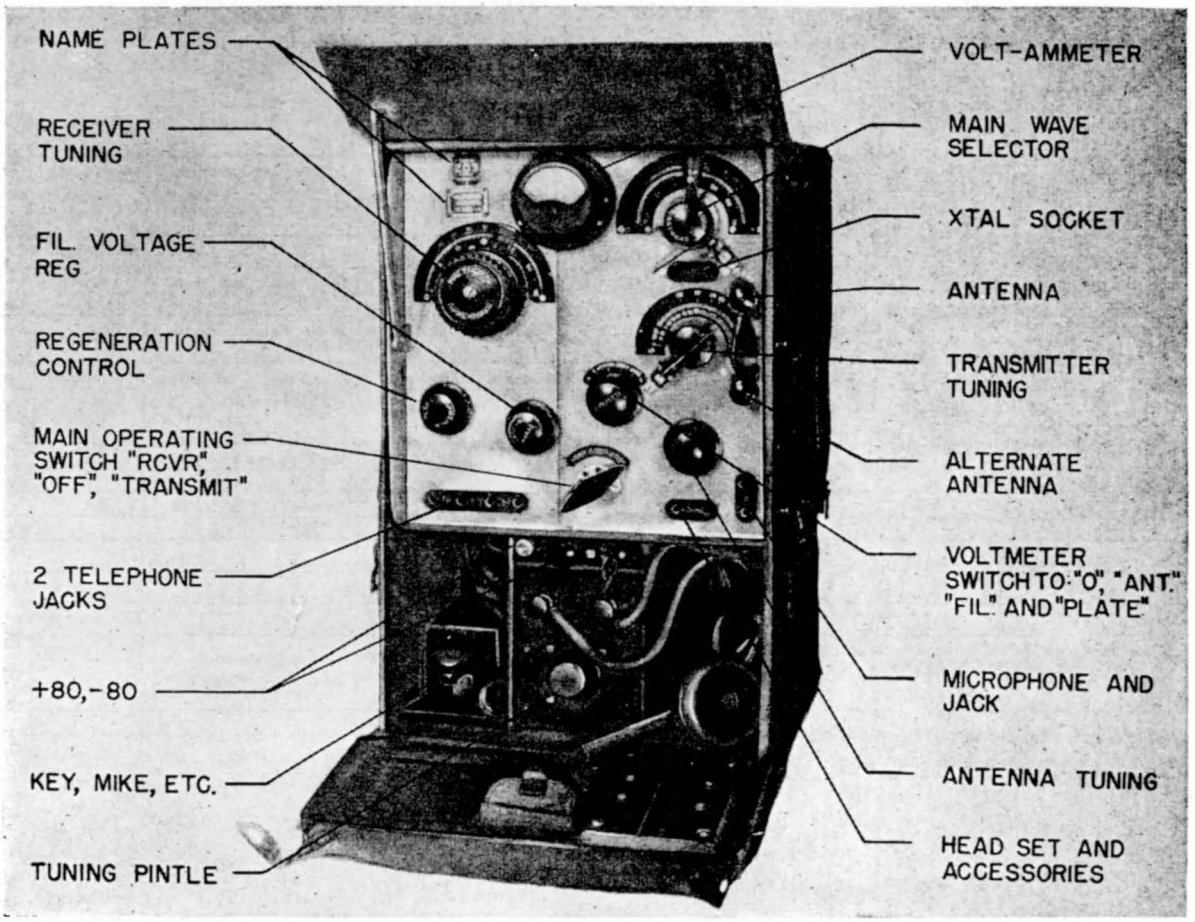


Figure 65. Transmitter-receiver 6–PK.

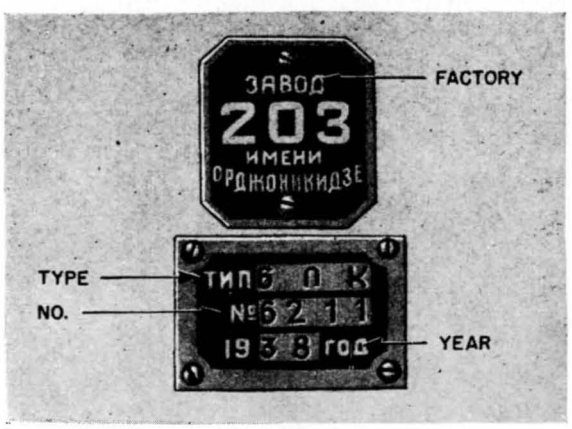


Figure 66. Nameplate for transmitter-receiver 6–PK.

2. INDIVIDUAL SETS

a. Portable and Mobile. The Red Army uses several types of portable and mobile radio sets.

6–PK. The 6–PK (figs. 65 and 66) is a pack type transmitter-receiver, utilizing similar triodes for all circuits, with the exception of the receiver radio frequency amplifier. The carrying case is rather flimsily constructed of wood, covered on the outside with canvas. The quality of construction is mediocre throughout. The operating controls are reasonably accessible. The set is poorly designed from the standpoint of maintenance.

CHARACTERISTICS

Nomenclature	6–PK.
Type	Transmitter-receiver.
Tubes	7 UB110 TRF with reg. det, (rcvr).
	1 SB112.
Frequency range	Xmtr—3.75–5.25 mc/s. (Nos. 150–210).
	Rcvr—3.75–5.5 mc/s. (Nos. 150–220).
Type signal and range	Antenna "A":
	CW—9.5 miles.
	Voice—4.5 miles.
	Antenna "B":
	Stationary:
	CW—4.5–6 miles.
	Voice—2.5–3 miles.
	Mobile: Voice—1.8 miles.
Transmitter control	Crystal (socket on front panel).
Power output	0.66 watt (approximate).
Power requirements	Plate—160 v.
	Fil.—4 v.
Power supply	Plate—2 BAS–80.
	Fil.—1 4–NKN–10.
Antenna dipole	"A"—98 feet long.
	"B"—4.9 foot rod with umbrella.
Tactical use	Infantry and artillery battalions.
Dimensions	17½ by 11 by 10½ inches.

4–R (RBS–40). The 4–R (RBS–40) (figs. 67, 68, and 69) is a small, compact transceiver, suitable for short range voice communication. It also can perform the functions of a field telephone, except that there is no bell for incoming calls. Received radio signals are fed to the telephone line, but the telephone line is not so connected that it can modulate the transmitter. The set is sturdily and neatly constructed and should be able to withstand the abuse of field operation. Some components of the set are difficult to reach and replace. The quality of the parts compares favorably with similar United States equipment. The chassis and case are aluminum. All wiring is rubber insulated. When the "TP-RADIO" switch is in the "TP" position, the microphone and headset are connected to the line through transformer (40). Pressing the "CALL" button converts tube (39) to an audio oscillator and generates a call signal.

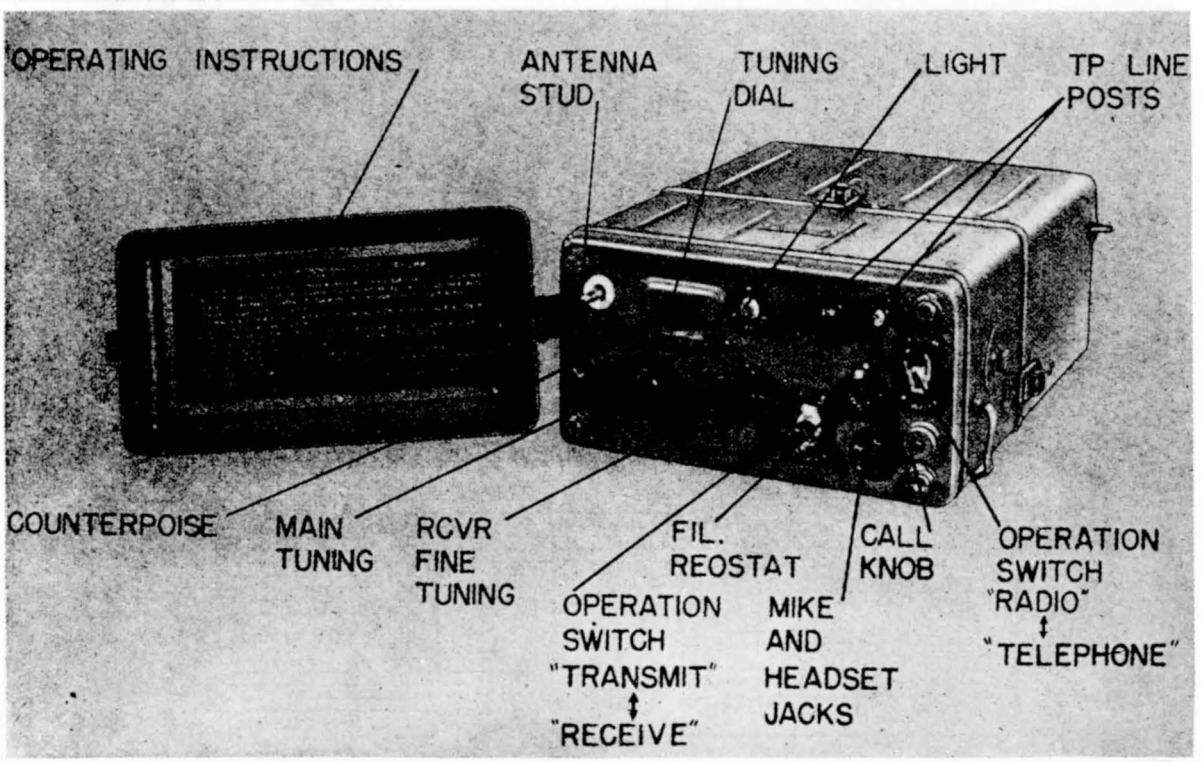


Figure 67. Transceiver 4–R (RBS–40).

CHARACTERISTICS

Nomenclature	4–R (RBS–40).
Type	Transceiver.
Tubes	Xmtr: 1 SO257 P. A. 1 UB240 M. O. 1 SB244 Mod. Rcvr: 1 SO241 TRF. 1 UB240 reg. det. (also Xmtr. M. O.). 1 SB244 audio (also Xmtr. Mod.).
Frequency range	33.25–40.5 mc/s. (Nos. 66–124).
Type signal and range	Voice: 7 miles (tone osc. for calling signal when used as telephone).
Type modulation	A. M.
Method of modulation	Plate.
Transmitter control	M. O.
Power output	5 w.
Power requirements	Xmtr: Fil.—2 v. at 600 ma. Plate—120 v. at 20–25 ma. Rcvr: Fil.—2 v. at 440 ma. Plate—120 v. at 10 ma. Buzzer fil.—50 ma.

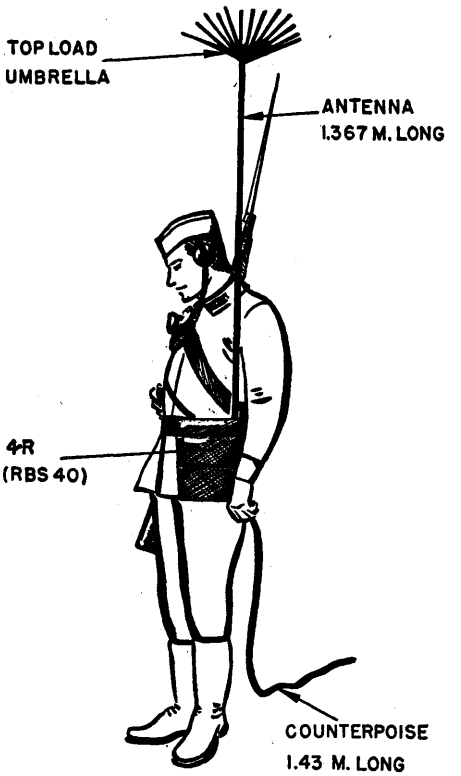


Figure 68. Transceiver 4–R (RBS–40) in mobile operation.

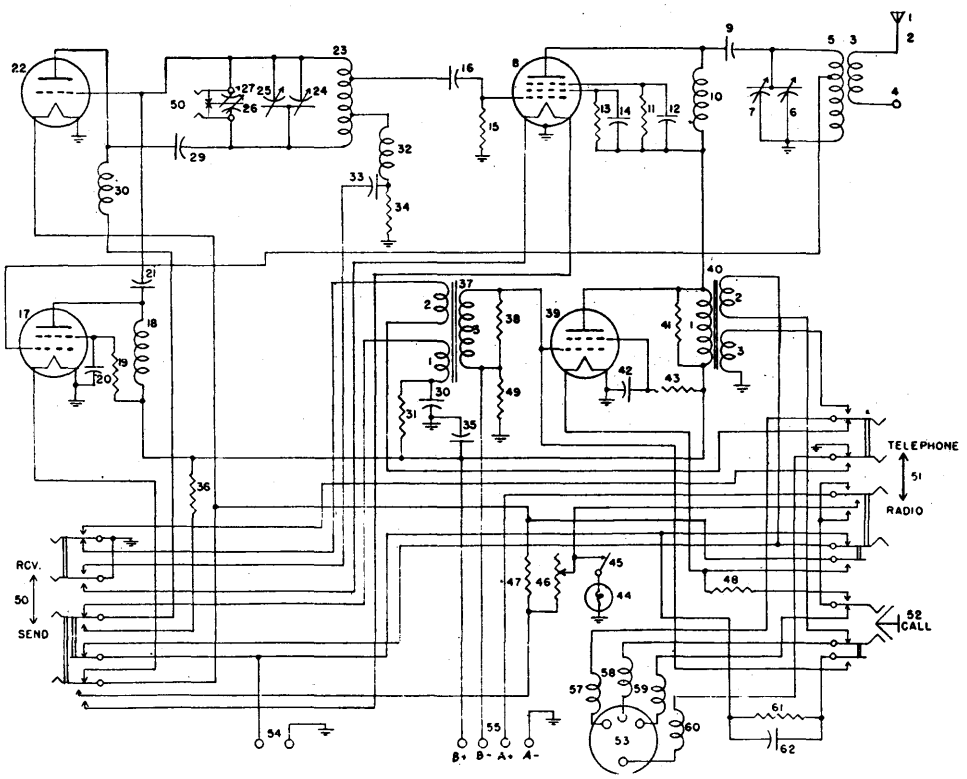


Figure 69. Circuit diagram of transceiver 4–R (RBS–40).

Operating Instructions for 4–R (RBS–40)

1. Open the cover. Turn it and fasten to front of set.

2. Attach the ground. Screw the antenna on antenna stud and extend the three sections of the antenna.

3. Insert handset plug in socket and open microphone.

4. Set the dial to the desired frequency.

5. Place switch "RADIO-TELEPHONE" in the "RADIO" position and switch "RECEIVE-TRANSMIT" in the "RECEIVE" position.

6. Turn rheostat one mark beyond the point at which a rushing sound is heard in the headset.

7. To transmit, place the "RECEIVE-TRANSMIT" switch in the "TRANSMIT" position.

8. To call, press button "T. L. G."

9. Adjust knob, near tuning knob, for best reception.

10. Before operation on a wire line, attach line to line terminals and place switch "RADIO-TELEPHONE" in the "TELEPHONE" position.

11. When operation is completed place switch "RADIO-TELEPHONE" to upright position and turn rheostat all the way to the left.

A–7–A. The A–7–A (figs. 70 and 71) is a FM transmitter-receiver. It is a one-man pack set and can be set up in 5 minutes. It also can be used as a telephone over up to 1½ miles of field wire. The set is believed to employ ground wave operation only. Receiver sensitivity is 1.5 microvolts. Narrow band modulation, 7 to 10 kilocycles, is utilized, 3.5 to 5 kilocycles on each side band. Band pass width is from 10 to 15 kilocycles. Transmitter and receiver stability characteristics are approximately the same. Mechanical error of graduation between +10° to −15° C. is not more than 25 kilocycles. Frequency variation due to voltage variation from +10° to −20° C. is not more than 4 kilocycles. Decoupling the antenna results in not more than 5-kilocycle change. Frequency deviation due to "self-heating" is not more than 5 kilocycles for 3 minutes and not more than 10 kilocycles for 15 minutes.

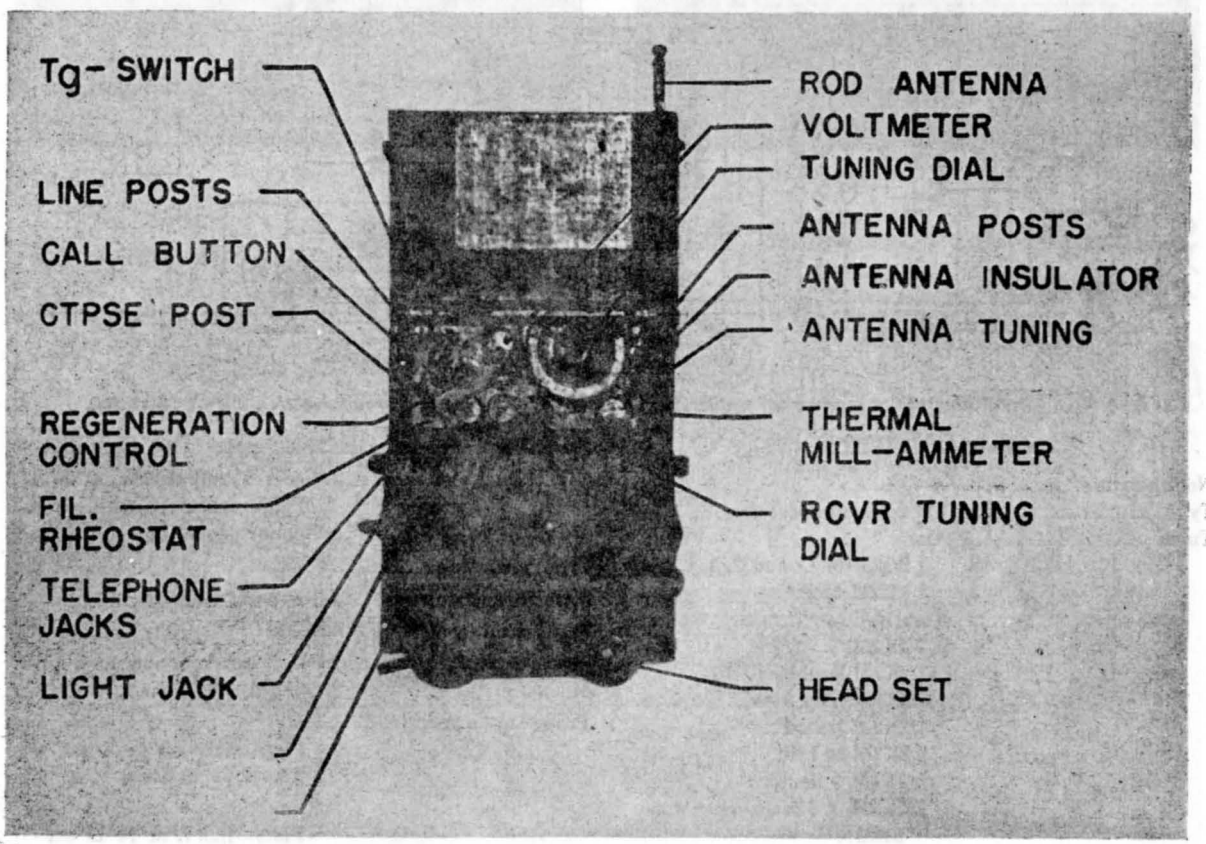


Figure 70. FM transmitter-receiver A–7–A.

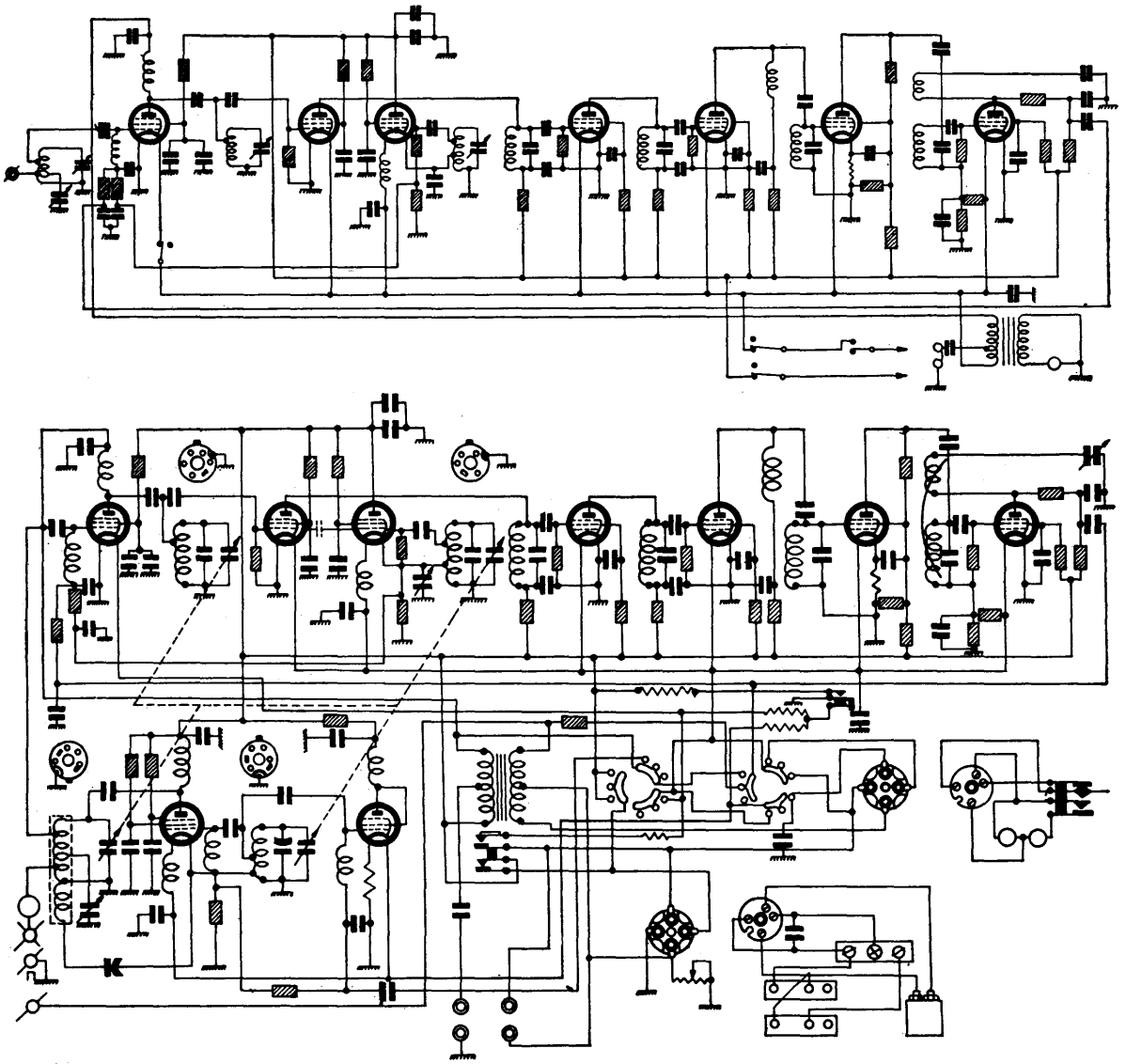


Figure 71. Circuit diagram of receiver for transmitter-receiver A–7–A (top) and of radio station A–7–A (bottom).

CHARACTERISTICS

Nomenclature ..... A–7–A.
Type ..... FM transmitter-receiver.
Tubes ..... Xmtr:
1 SO257 M. O. and P. A.
1 2K2M Mod.
Rcvr:
7 2K2M.
1 2K2M local osc.
1 2K2M freq. conv.
1 2K2M 1st I. F.
1 2K2M 2d I. F.
1 2K2M 1 limiter.
1 2K2M 1 discriminator (unusual).
1 2K2M audio.

Frequency range ..... 27–32 mc/s. (101 channels).
Type signal and range ..... Voice: Good terrain, 6 miles. Poor terrain, 4½ miles. Telephone, 1½ miles.
Type modulation ..... F. M.
Method of modulation ..... Reactance tube.
Transmitter control ..... M. O.
Power output ..... 1 watt antenna (current at base of antenna, 70 ma.).
Power requirements ..... Xmtr:
Plate—160 v. at 25–30 ma.
Fil.—2.4 v. at 0.35 a.
Rcvr:
Plate—160 v. at 10–12 ma.
Fil.—2.4 v. at 0.42 a.

Power supply	Plate: 2 BAS–80 batteries. Fil.: 2–NKN–10 batteries.
Antenna	Rod 2: 8.1 feet (umbrella, 3-wire counterpoise).
Tactical use	Rifle regiments and artillery battalions.
Dimensions	11.3 by 16.5 by 14 inches over-all; 8.2 by 15 by 12.8 inches without accessories.
Weight	46.2 pounds over-all.

12–RP. The 12–RP (figs. 72, 73, 74, and 75) transmitter is capable of mobile and stationary operation. Two men can transport it. The lower frequency range, 2 to 3.45 megacycles per second (Nos. 80 to 138), has dial graduations every 5 fixed wave numbers. The higher frequency range, 3.45 to 6 megacycles per second (Nos. 138 to 240), has dial graduations every 10 fixed wave numbers. On the lower portion of the set are two lamp sockets, marked "OSV," used to illuminate the dials during operation at night. Trained operators can put the set into operation in approximately 3 minutes. It is capable of 26 hours operation on the same batteries, which includes 6 hours on "transmit" and 20 hours on "receive."

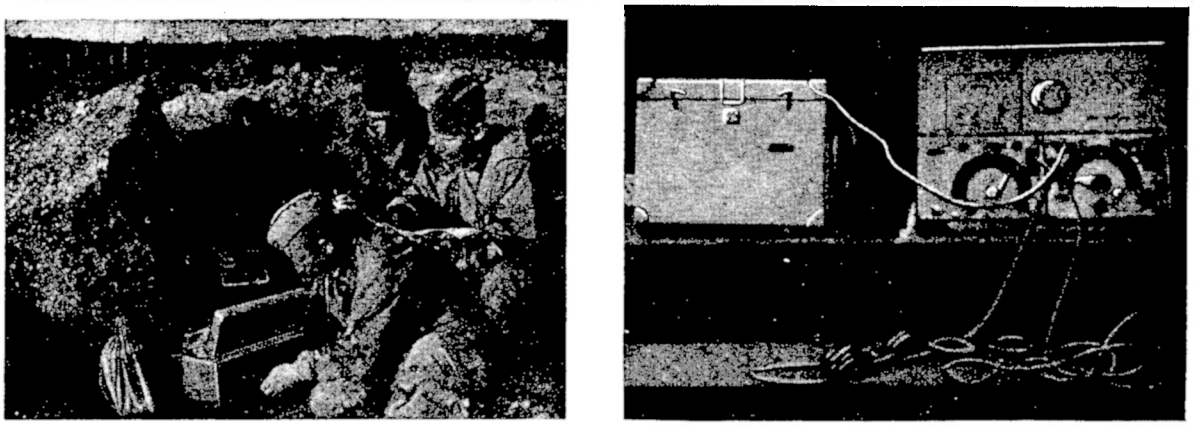


Figure 72. Transmitter-receiver 12–RP.

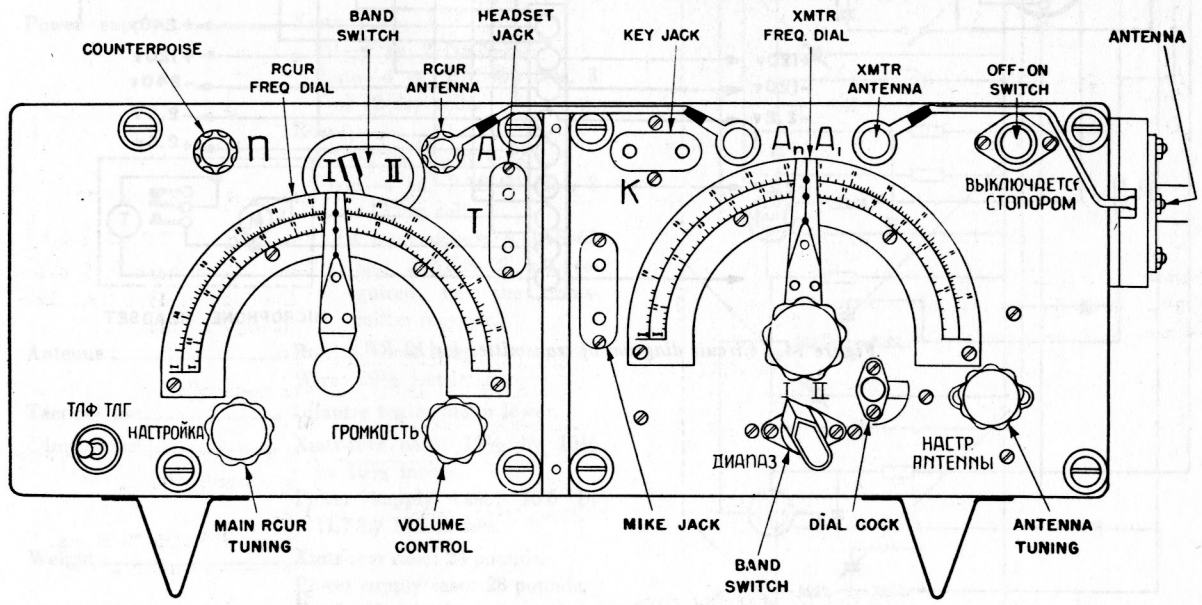


Figure 73. Panel of transmitter-receiver 12–RP.

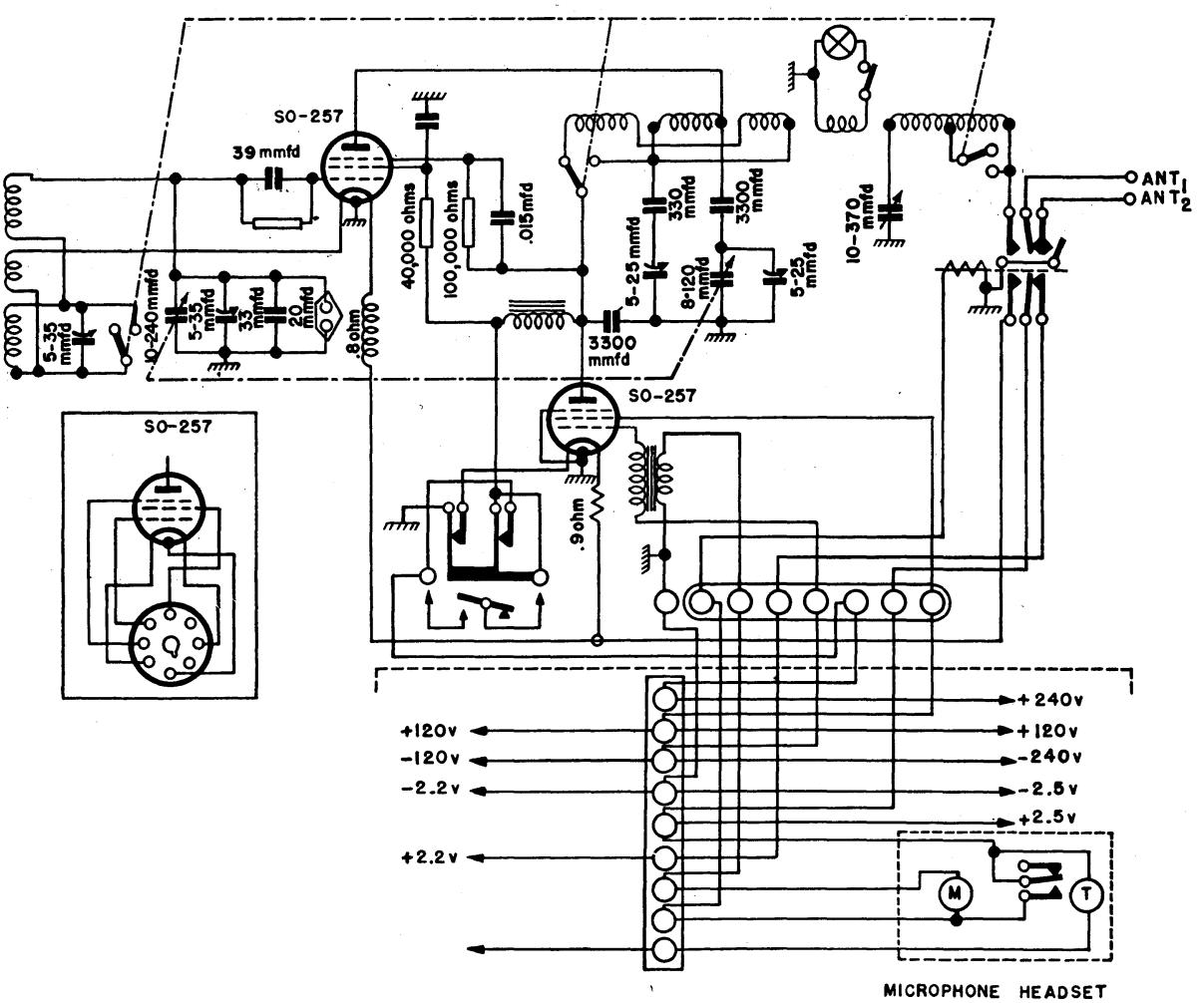


Figure 74. Circuit diagram of transmitter for 12–RP.

CHARACTERISTICS

Nomenclature	12–RP.
Type	Transmitter-receiver.
Tubes	Xmtr: 1 SO257 M. O. and P. A. 1 SO257 Mod. Rcvr: 1 SO241 R. F. 1 SB242 Mixer and L. O. 1 SO241 I. F. 1 SB242 2d det. and B. F. O. 1 SB244 audio.
Type signal and range	Rod antenna: 4.9 feet. Stationary: Voice—4.8 miles. CW—9.6 miles. Mobile: Voice—5 miles. Wire antenna (29½ feet): Stationary: Voice—3.6 miles. CW—7.2 miles.
Type modulation	A. M.
Method of modulation	Screen grid.
Transmitter control	M. O.
Power output	
Power requirements	Xmtr: Fil.—2.5 volts. Plate—240 volts. Rcvr: Fil.—2.5 volts. Plate—120 volts at 8.5–10 ma.
Power supply	Xmtr: Fil.—2 ea. 2–NKN–22. Plate—4 ea. BAS–60 Nos. 3 or 12 dry cells. Rcvr: Fil.—2 ea. 2–NKN–22. Plate—4 ea. BAS–60 Nos. 3 or 12 dry cells. (A total of only 4 BAS–60 and 2–NKN–22 are required for the transmitter-receiver.)
Antenna	Rod: 4.9 feet long. Wire: 29½ feet long.
Tactical use	Infantry regiments or lower.
Dimensions	Xmtr-rcvr case: 19½ by 10½ by 10½ inches. Power supply case: 15.6 by 11.7 by 10.1 inches.
Weight	Xmtr-rcvr case: 24 pounds. Power supply case: 28 pounds. Total: 52 pounds.

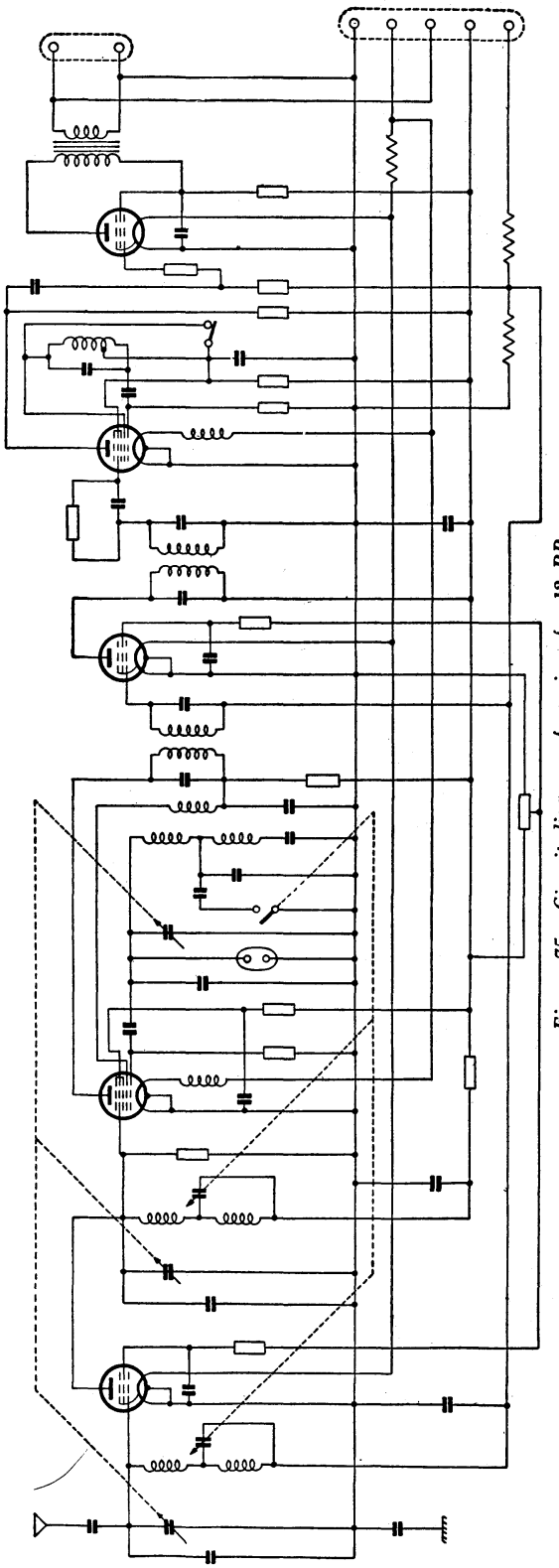


Figure 75. Circuit diagram of receiver for 12–RP.

13–R. The 13–R (figs. 76 and 77) is a transceiver of approximately 2 watts output. It operates on from 1.75 to 4.25 megacycles (Nos. 70 to 170). When the set is operated on waves Nos. 70 to 100, its range is increased from 25 to 30 percent. For calibration, the local oscillator is zero beat to the master oscillator, and is tuned externally with a vernier adjustment. The transmitter

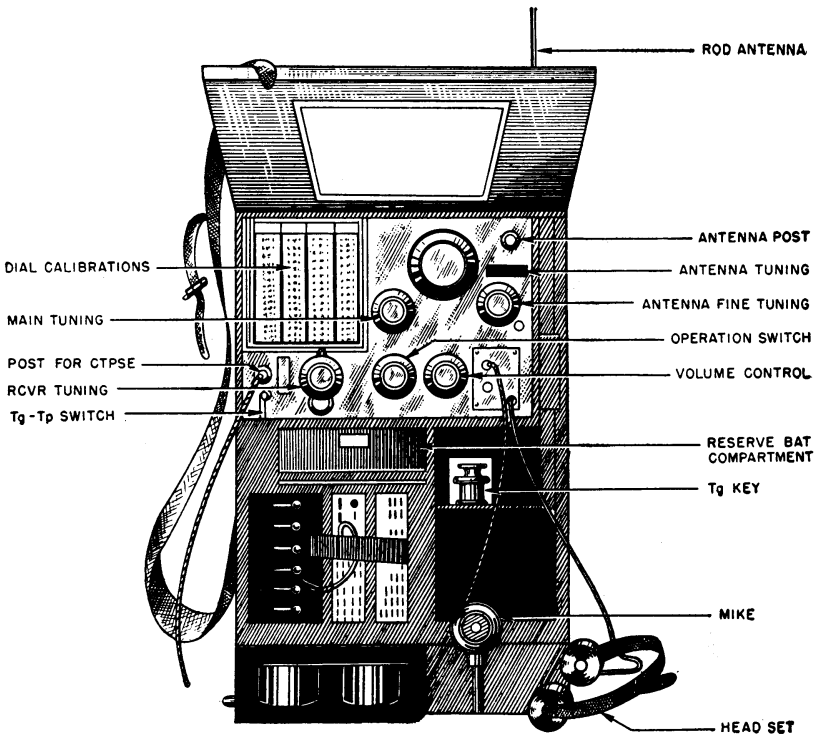


Figure 76. Transceiver 13–R.

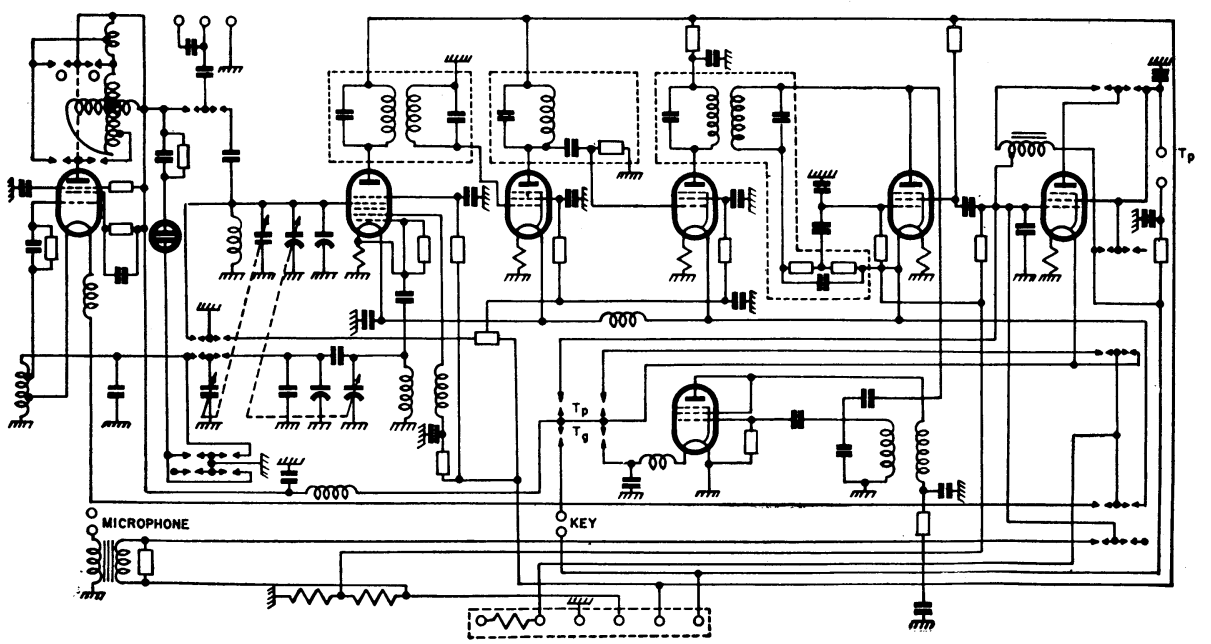


Figure 77. Circuit diagram of transceiver 13–R.

is keyed in the plate circuit and utilizes a neon lamp indicator. The frequency scale is divided into two parts and is color coded. The red band includes waves Nos. 70 to 90. The yellow band includes waves Nos. 80 to 170. The set utilizes miniature tubes.

CHARACTERISTICS

Nomenclature	13–R.
Type	Transceiver.
Tubes	Xmtr: 1 SO257 M. O. and P. A. (SB245 can be substituted). 1 SO241 Mod. (used as pentode, also as triode rcvr output). Rcvr: R. F. and L. O.: 1 SB242. 1 SO241 1st I. F. 1 SO241 2d I. F. 2d det., A. V. C., 1st audio: 1 SO241. 1 SO241 B. F. O. 1 SO241 2d det., A. V. C. (also Xmtr Mod.) (NOTE.—2d det. and B. F. O. also can use 2K2M.)
Frequency range	1.75–4.25 mc/s (Nos. 70–170).
Type signal and range	Inverted "L" antenna (11 meters long, 3–4 meters high): CW: Day—6 miles. Night—15 miles. Voice: Day—5 miles. Night—10 miles. Rod antenna (6.8 feet long): CW: Day—5 miles. Night—10 miles. Voice: Day—3 miles. Night—7 miles.
Type modulation	Plate.
Transmitter control	M. O.
Power output	2 watts (approximate).
Power requirements	Xmtr: Plate—200 v. at ? ma. Fil. 2.5 v. at ? ma. Rcvr: Plate: 120 v. at ? ma. Fil. 2.5 v. at ? ma.
Power supply	Plate: 4 dry batteries BAS–60, Nos. 3 or 12. Fil: 4 dry batteries 4–S or 3–S; or 1 2–NKN–10 alkaline wet cell. (Note: The plate batteries are in series and have a life of from 25 to 27 hours. The filament batteries are connected by two's in series parallel and have, for type 4–S or 3–S, from 15 to 17 hours operation; and for type 2–NKN–10 from 25 to 30 hours.)
Antenna	Rod 6.8 feet long and inverted "L" 35.9 feet long and 8 to 10 feet high.
Tactical use	Company level and vehicular.
Dimensions	Over-all: 19.1 by 14.8 by 10.5 inches. Case: 16.7 by 12 by 8.8 inches.
Weight	Case alone: 44 pounds.

5–AK–1M. The 5–AK–1M (figs. 78, 79, and 80) is a transmitter-receiver of 20 watts output. It is installed in GAZ–A, –AA, and –AAA trucks, Pikap vehicles, three-axle buses, wagons, and carts. When the station is installed in the GAZ–AAA truck, the GM–71 generator is used to recharge the 5–NKN–60 batteries. The set employs blocked grid keying. Output may be reduced to 30 or 60 percent of maximum by adding or removing resistors used as grid leaks in the power amplifier control grid circuit.

CHARACTERISTICS

Nomenclature	5–AK–1M. Xmtr: 20–KV–1. Rcvr: 5–RKU.
Type	Transmitter-receiver.
Tubes	Xmtr: 1 GK20 M. O. 1 GK20 P. A. 1 GK20 Mod. Rcvr: 1 SB112 1st R. F. 1 SB112 2d R. F. 1 SB112 reg. det. 1 UB110 1st audio. 1 UB110 2d audio.
Frequency range	Xmtr: 3.25–4.75 mc/s. (Nos. 130 to 190). Rcvr: 3.25–5.25 mc/s. (Nos. 130 to 210).
Type signal and range	Stationary: CW—60 miles. Voice—30 miles. Mobile: Voice—12 miles.

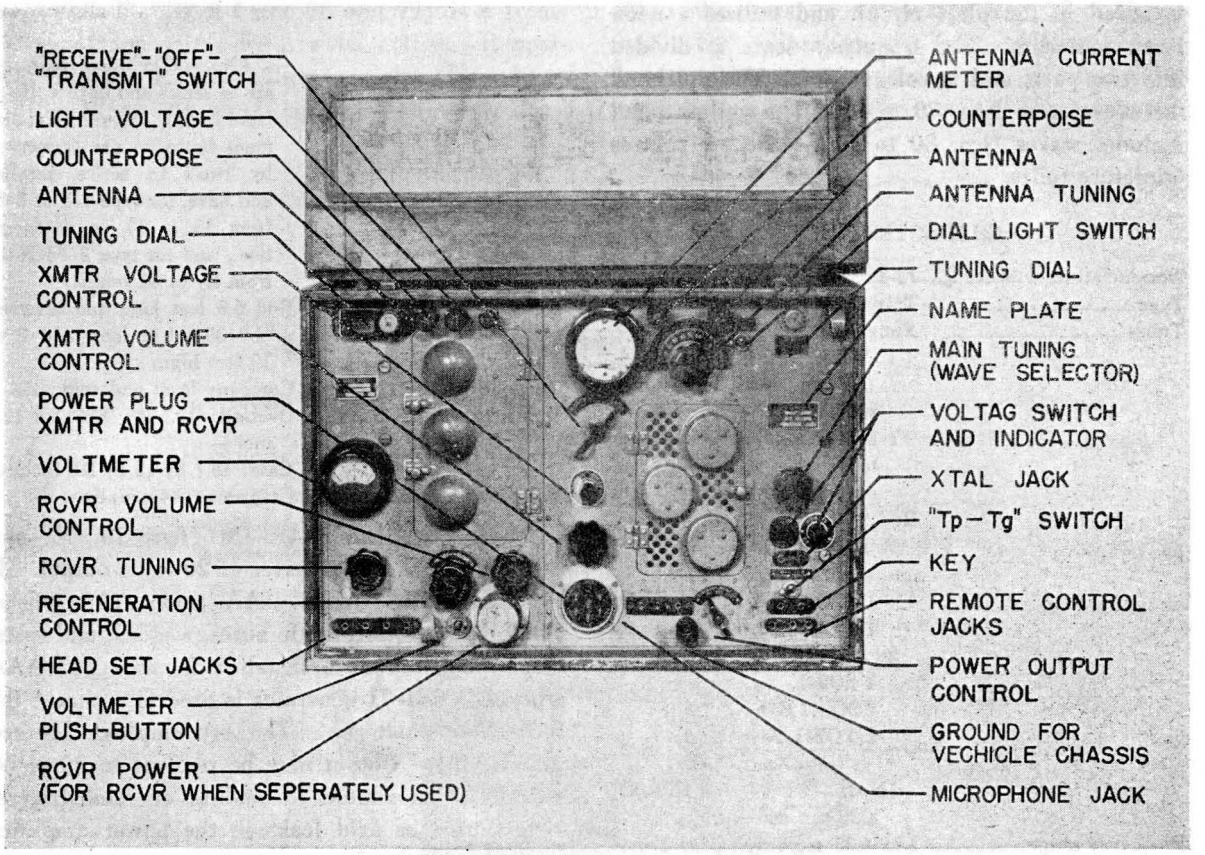


Figure 78. Transmitter-receiver 5–AK–1M.

Type modulation	Plate.
Method of modulation	Heising.
Transmitter control	M. O. and plug-in xtal.
Power output	20 watts (can be reduced to 30 percent and 10 percent of maximum).
Power requirements	Xmtr-plate: 750 v. at 22 ma. Filament: 5.6 v. at ? ma. Rcvr-plate: 160 v. at 15 ma.
Power supply	Xmtr: 2 each 5–NKN–60 or 2 each 5–NKN–45 with dynamotor RUN–75. Rcvr: 2 each 4–NKN–2 and 2 each BAS–80.
Antenna	Vehicular: 2 each 18.3-foot masts and 2-wire antenna. Stationary: Wire.
Tactical use	Division and regiment.
Dimensions	20.4 by 13.4 by 10.1 inches over-all.
Weight	Station and accessories: 286.4 pounds.

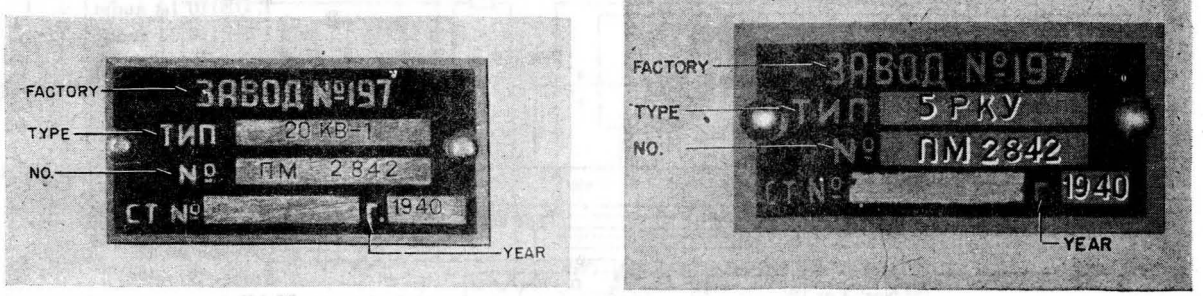
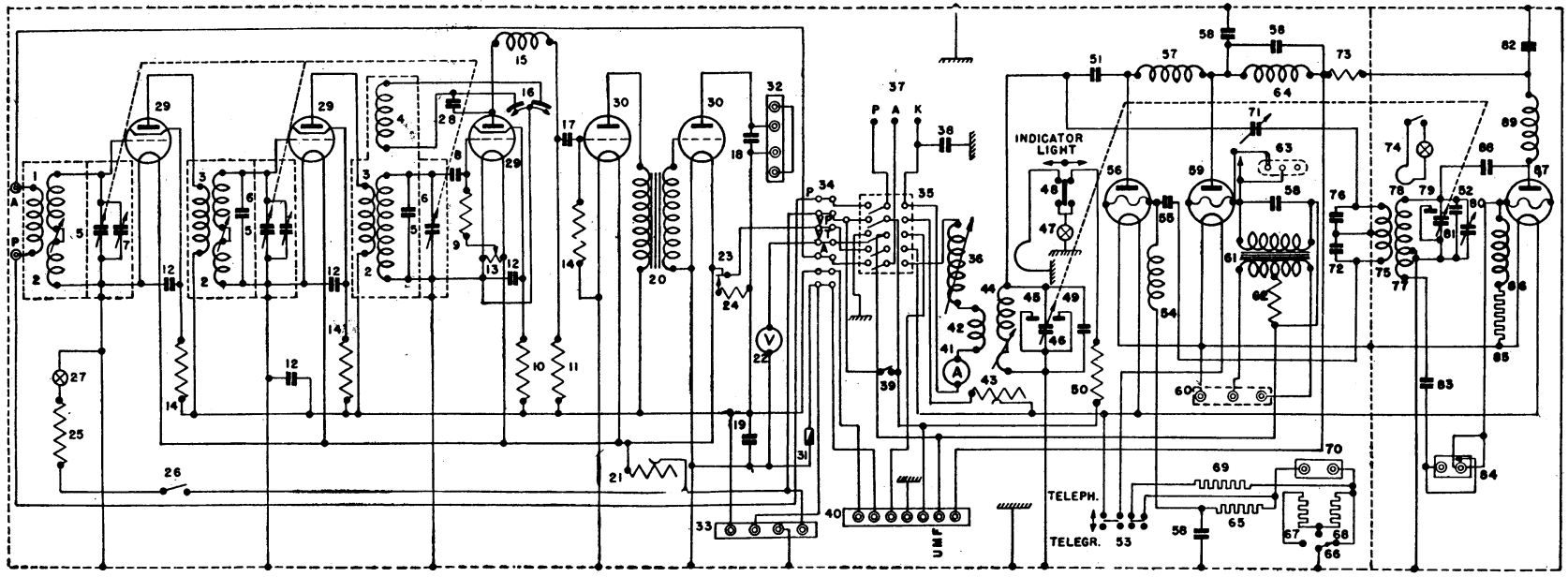


Figure 79. Nameplates for transmitter (left) and receiver (right) of 5–AK–1M.



1. .0057 MH- 18 OHMS
2. .0163 MH
3. .0158 MH
4. .00376 MH
5. 270 MMFD.
6. 10 MMFD.
7. 8 MMFD.
8. 50 MMFD.
9. 2.5 MEGOHMS
10. .5 MEGOHMS
11. 100,000 OHMS
12. 5,000 MMFD.
13. 15 & 135 OHMS- 150 OHMS
14. 150,000 OHMS
15. 1.7 MH
16. 130 MMFD.
17. .1 MFD.
18. 2000 MMFD.
19. 1 MFD.
20. TRANSFORMER 1:3
21. 25 OHMS
22. VOLTMETER 8-200V.
23. VOLTMETER BUTTON
24. MULTIPLIER
25. 18 OHMS
26. LIGHT JACK
27. 3.5 V.
28. 2000 MMFD.
29. TUBE SB112
30. TUBE UB110
31. .25A.
32. TP JACK
33. POWER JACK
34. SWITCHING BLOCK
35. MAIN SWITCH
36. .029-.0057 MH
37. ANT. & GND.
38. .1 MFD.
39. XMTR. SWITCH
40. CONNECTION BLOCK
41. 1.5A.
42. 2 TURNS ANT. PICK-UP
43. 1.3 OHMS
44. .0085 MH
45. 15 MMFD.
46. 300 MMFD.
47. 3.5 V.
48. LIGHT SWITCH
49. 75 MMFD.
50. 18 OHMS
51. 500 MMFD.
52. 40 MMFD.
53. TP-TG SWITCH
54. .6 MH
55. 500 MMFD.
56. TUBE GK-20
57. .6 MH
58. 500 MMFD.
59. TUBE GK-20
60. MICROPHONE JACK
61. DIFFERENTIAL MICROPHONE TRANSFORMER PRIMARY 2EA. 160 TURNS SEC. 3200 TURNS
62. 18 OHMS
63. REMOTE MOD. JACK
64. 9 MH
65. 10,000 OHMS
66. POWER SWITCH
67. 100,000 OHMS
68. 50,000 OHMS
69. 15,000 OHMS
70. 1G JACK
71. 60 MMFD.
72. 45 MMFD.
73. 15,000 OHMS
74. OSCILLATION INDICATOR
75. .0086 MH
76. 400 MMFD
77. .0036 MH
78. .0085 MH
79. 15 MMFD.
80. 60 MMFD.
81. 300 MMFD.
82. 500 MMFD.
83. 500 MMFD.
84. CRYSTAL JACK
85. 2000 OHMS
86. .6 MH
87. TUBE GK-20
88. 500 MMFD.
89. .6 MH

Figure 80. Circuit diagram of transmitter-receiver 5-AK-1M.

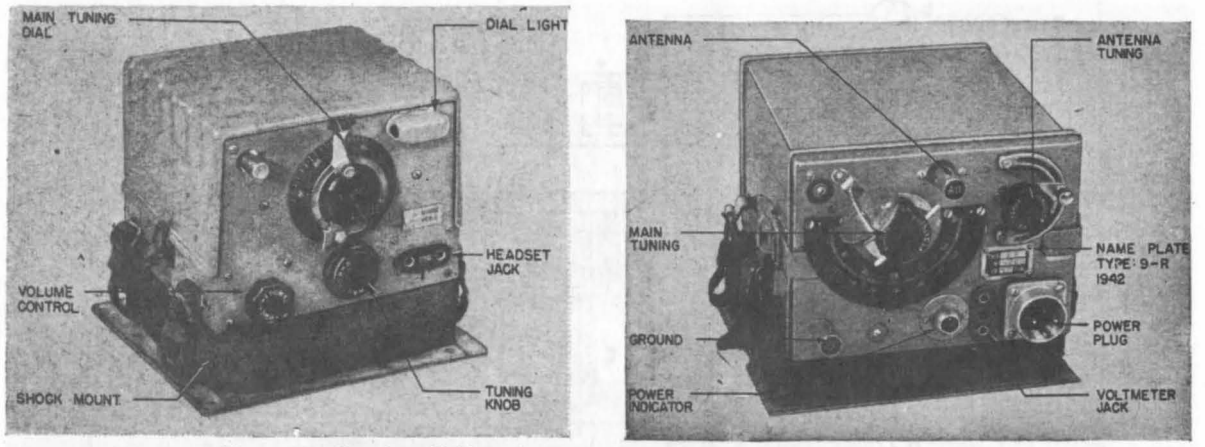


Figure 81. Receiver (left) and transmitter (right) of transmitter-receiver 9–R.

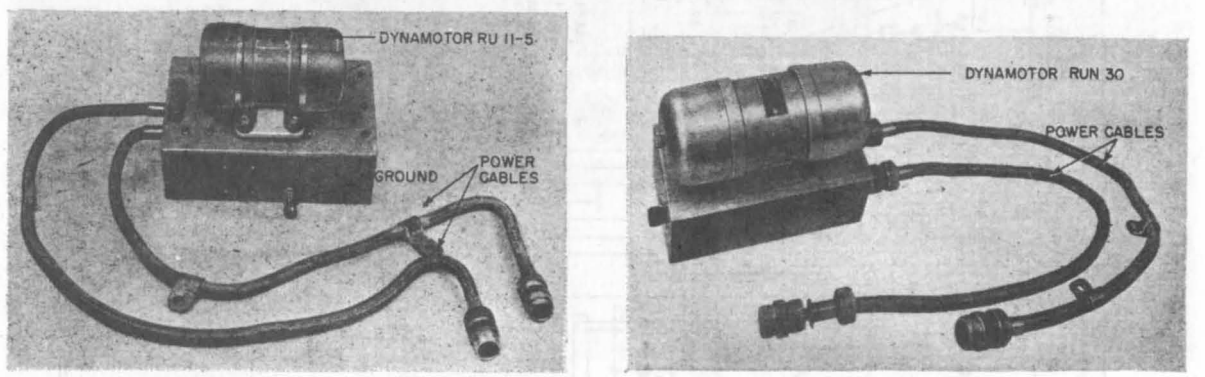


Figure 82. Dynamotors for receiver (left) and transmitter (right) of transmitter-receiver 9–R.

b. Tank and self-propelled. All tanks and self-propelled vehicles are equipped with transmitters and receivers. The 10–R radio and the TPU–4 telephone system were mounted in the old KV heavy tank. The T–34 medium tank and the T–70 light tank are fitted with 9–R radio sets. The T–34 is fitted with the TPU–3 telephone system, and the TPU–2 telephone system is mounted in the T–70. Tank crews communicate with infantry riders by use of an exterior buzzer system located on the left rear of the tank hull.

9–R. The 9–R (figs. 81 through 85) is a tank transmitter-receiver of 5 watts output (antenna). Unlike the 10–R, the receiver does not have the audio type beat frequency oscillator. The rod antenna on the T–34 medium and the T–70 light tanks will tilt 90° to minimize damage by low-hanging obstructions.

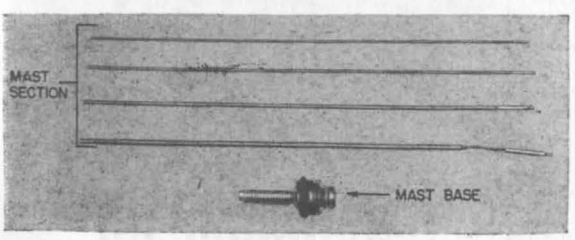


Figure 83. Antenna for transmitter-receiver 9–R.

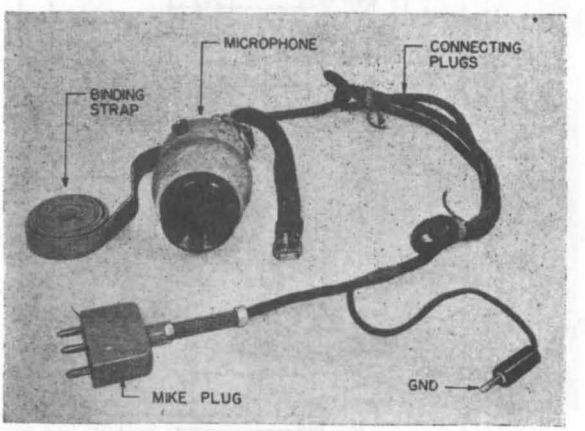


Figure 84. Microphone for transmitter-receiver 9–R.

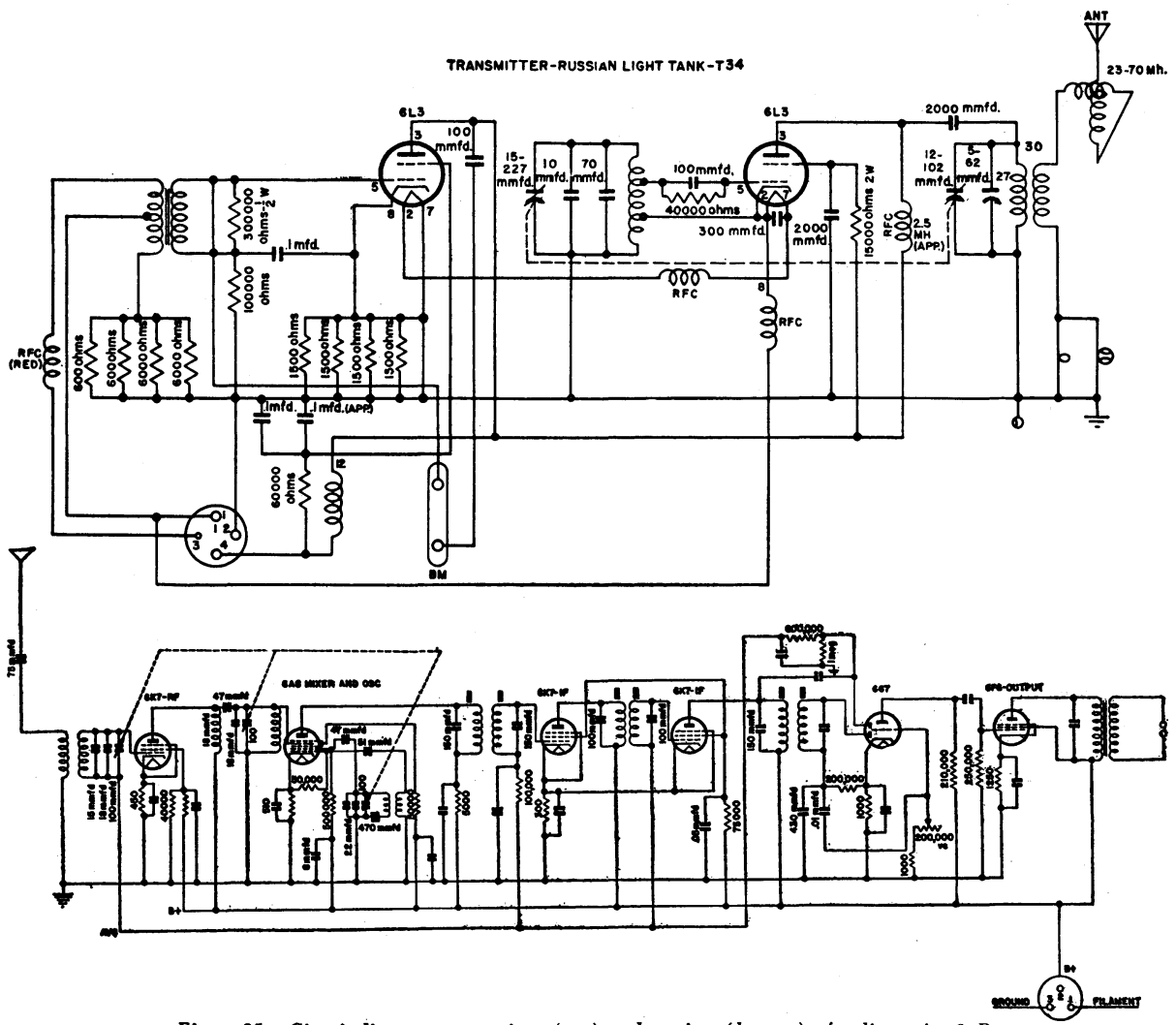


Figure 85. Circuit diagrams transmitter (top) and receiver (bottom) of radio station 9–R.

CHARACTERISTICS

Nomenclature	9–R.
Type	Tank transmitter-receiver.
Tubes	Xmtr: 1 6L3 M. O. P. A. 1 6L3 Mod. Rcvr: 1 6K7 R. F. amp. 1 6A8 mixer. 1 6K7 1st I. F. 1 6K7 2d I. F. 1 6G7 2d det., A. V. C, and 1st audio 1 6F6 2d audio.
Frequency range	Xmtr: 4–5.625 mc/s. (Nos. 160–223). Rcvr: 4–5.625 mc/s. (Nos. 160–223).
Type signal and range	Stationary: CW—30 miles. Voice—15 miles. Mobile: Voice—5 miles.
Type modulation	A. M.
Method of modulation	Plate.
Transmitter control	M. O.
Power output	5 watts (antenna).
Power requirements	Rcvr: 12 v. at 4.7 amp.
Power supply	Battery, dynamotors. Xmtr: RUN–30. Rcvr: RU 11–5.
Antenna	Top-loaded rod antenna from 3 to 20 feet long.
Tactical use	T–34 (medium) and T–70 (light) tanks.
Dimensions	Xmtr: 7 by 7 by 9 inches. Rcvr: 7 by 7 by 10 inches.
Weight	75 pounds.

10–R. The 10–R (figs. 86 through 91) is a low-power tank set, apparently designed for short distance communication on preselected channels. The receiver is a conventional superheterodyne with one major exception. Instead of the usual beat frequency oscillator, the first intermediate frequency amplifier can be connected as an audio frequency oscillator and mixer. The audio frequency modulates the intermediate frequency, and an audible signal is produced in the headphones. This system has some advantages over the B. F. O. The audio frequency is determined by the constants of the audio oscillator circuit, and always is the same, regardless of input signal level or accuracy of tuning. The system does not require frequent readjustment, as does the B. F. O. The level of the audio signal is determined by the level of the I. F. signal. Thus, the audio output is maximum when the receiver is tuned properly to the input signal. There is a single peak in the output, in contrast to the double peak of most beat frequency oscillators. The receiver has a frequency range of from 3.75 to 6 megacycles, in one band. It may be tuned by either of two preselected frequency switches, or may be tuned manually.

The transmitter is unconventional, and is not believed to be as efficient as more standard circuits. In general, it is a crystal oscillator, which may be plate modulated. However, many details are unusual. The oscillator plate tank circuit is tuned by utilizing the capacity of the antenna in series with capacitor (6) and making the plate inductance variable. This system undoubtedly does not provide as stable tuning as the more conventional variable capacitor.

There is an almost complete lack of indicators, the only one being a neon tube coupled to the antenna. Keying is accomplished by opening or grounding the oscillator screen grid circuit. The purpose of the lower primary on the input transformer and the reason for returning the lower end of the secondary to the socket are not known. These circuit peculiarities possibly could be part of the intercommunication system. The transmitter may be tuned to either of two preselected frequencies.

Tube filaments are supplied from the vehicular 12-volt battery. Resistors and series-parallel connections are used to reduce the voltage. Plate voltages are supplied by two dynamotors.

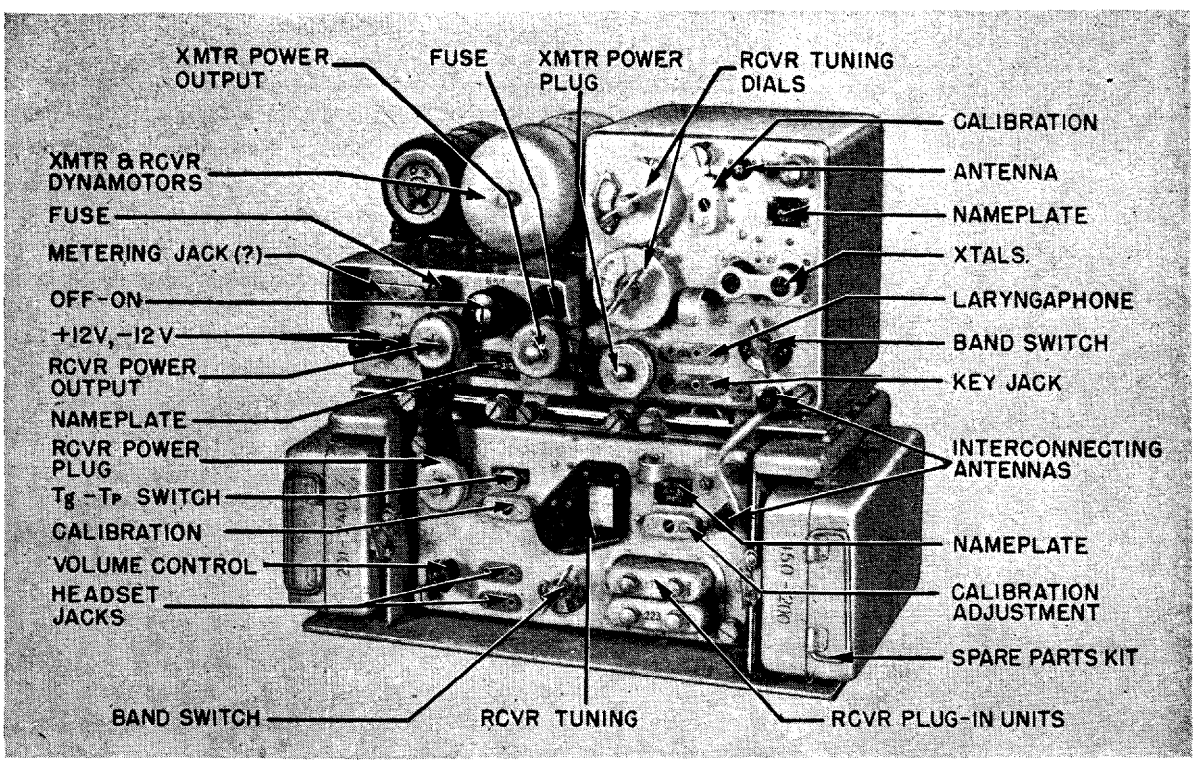


Figure 86. Transmitter-receiver 10–R.

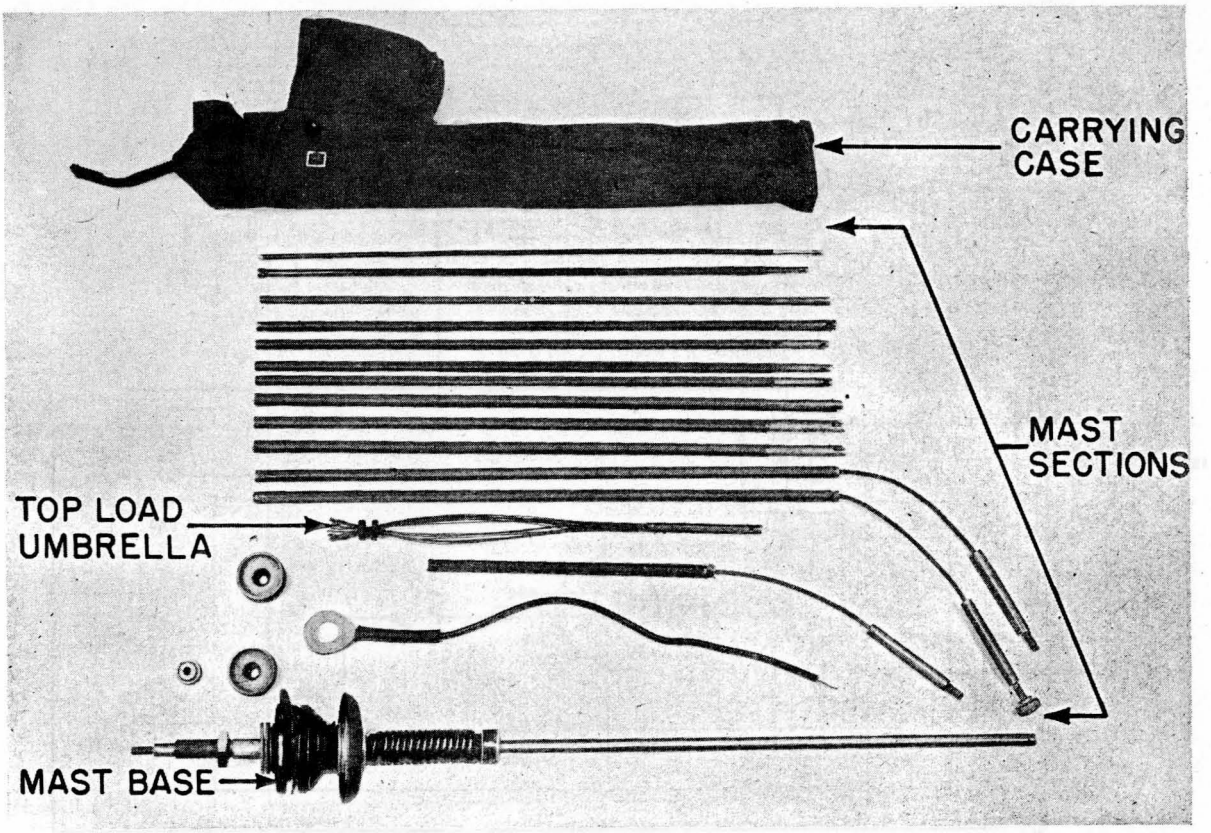


Figure 87. Antenna for transmitter-receiver 10–R.

The outside cover of each component in the rack is made of steel. Most other metal parts are aluminum. Individual parts are markedly similar to corresponding United States parts. A small metal case fastened to the right end of the rack carries extra transmitter crystals and receiver plug-in units.

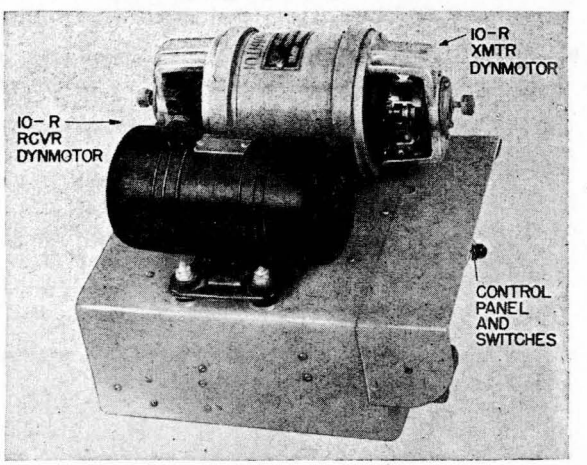


Figure 88. Headset (left) and dynamotors (right) for radio station 10–R.

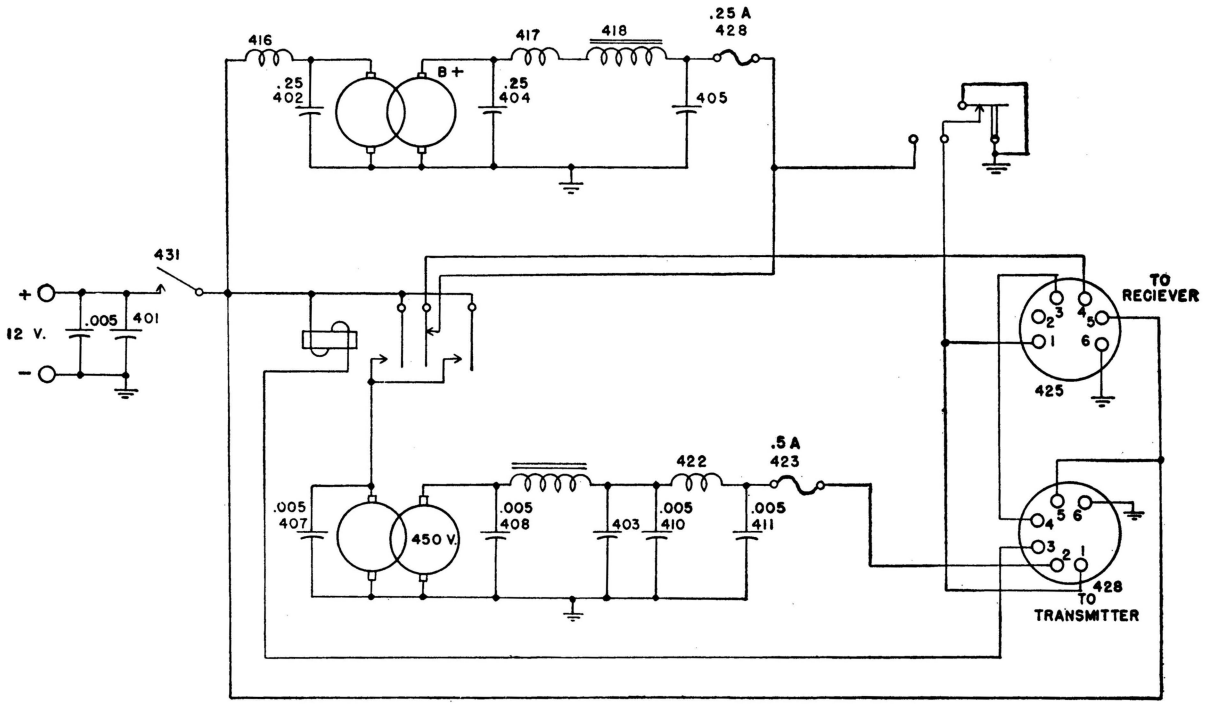
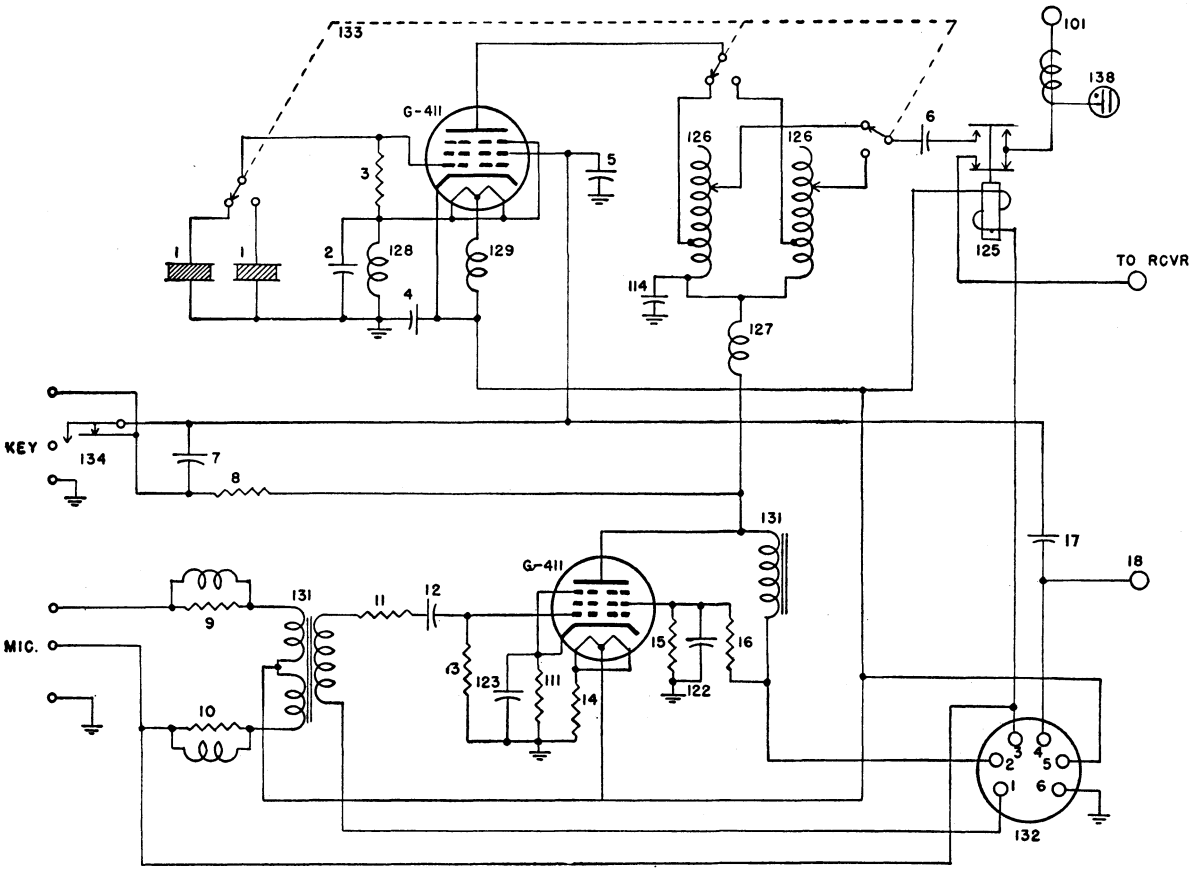


Figure 89. Circuit diagram of power supply for radio station 10–R.

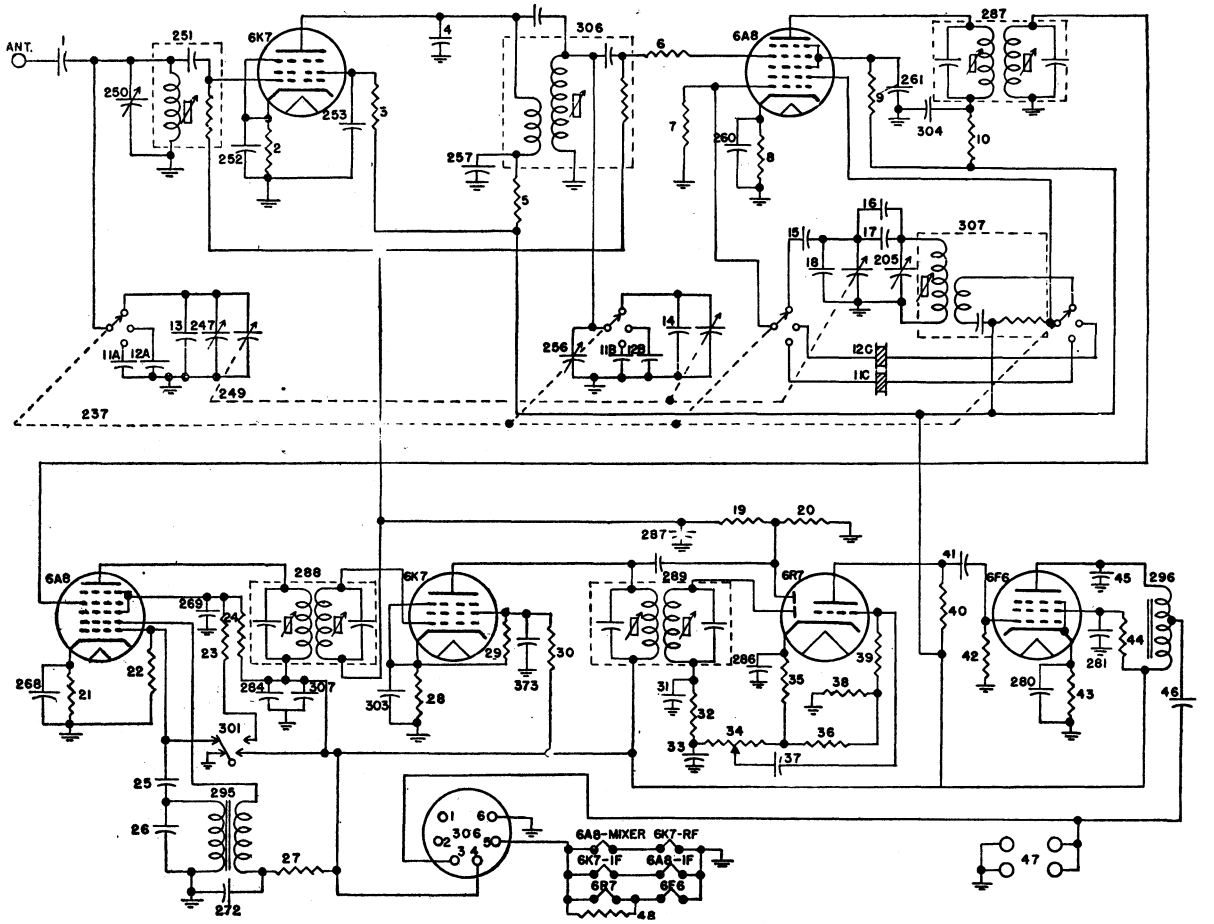


1. Plug-in crystals.
2. Oscillator filament bypass capacitor, 350 mmf.
3. Oscillator grid resistor, 50 K ohms.
4. Oscillator cathode bypass capacitor, .004 mf.
5. Oscillator screen bypass capacitor, .004 mf.
6. Antenna coupling capacitor, .01 mf.
7. Part of click filter, .002 mf.
8. Oscillator screen resistor, 20 K ohms.
9. Microphone resistor, shunted by R. F. choke, 42 ohms.
10. Microphone resistor, shunted by R. F. choke, 25 ohms.
11. Input transformer loading resistor, 11 K ohms.
12. Coupling capacitor to modulator grid, .001 mf.
13. Modulator grid resistor, 500 K ohms.
14. Modulator filament resistor, 3.3 ohms.
15. Modulator screen divider resistor, 55 K ohms.
16. Modulator screen resistor, 20 K ohms.
17. Sidetone coupling capacitor; size unknown.
18. Single banana jack; purpose unknown.

NOTE: The above parts are not Soviet numbered. The numbers were assigned arbitrarily. The following parts have the numbers painted on them.

101. Antenna terminal.
111. Modulator cathode resistor, 500 ohms.
114. Oscillator plate decoupling capacitor, .002 mf.
122. Modulator screen bypass capacitor, .25 mf.
123. Modulator cathode bypass capacitor, 1 mf.
125. Antenna change-over relay.
126. Oscillator tank coils, trolley-type variable.
127. Oscillator plate R. F. choke.
128. Oscillator filament R. F. choke.
129. Oscillator filament R. F. choke.
131. Microphone input transformer.
131. Modulator plate load inductance.
132. Power input socket.
133. Frequency selector switch, 3-section, 2-position.
134. Key jack.
138. Neon R. F. indicator.

Figure 90. Circuit diagram of transmitter for radio station 10-R.


ANT.
6K7
6A8
6R7
6F6
6A8-MIXER 6K7-RF
6K7-IF
6A8-IF
6R7
6F6
237
249
272
295
296
301
303
306
307
373

1. Antenna coupling capacitor, 30 mmf., mica.
2. R. F. amplifier cathode resistor, 300 ohms.
3. R. F. amplifier screen resistor, 150 K ohms.
4. R. F. amplifier plate bypass capacitor, 10 mmf., mica.
5. R. F. amplifier plate decoupling resistor, 10 K ohms.
6. Mixer grid suppressor resistor, 260 ohms.
7. Mixer-oscillator grid resistor, 50 K ohms.
8. Mixer cathode resistor, 300 ohms.
9. Mixer screen resistor, 40 K ohms.
10. Mixer plate decoupling resistor, 10 K ohms.
11. A, B, and C, plug-in unit for fixed frequency (red).
12. A, B, and C, plug-in unit for fixed frequency (yellow).
13. R. F. amplifier fixed trimmer capacitor, 20 mmf., mica.
14. Mixer fixed trimmer capacitor, 30 mmf., mica.
15. Oscillator series padding capacitor, 60 mmf., mica.
16. Oscillator series padding capacitor, 1000 mmf., mica.
17. Oscillator series padding capacitor, 200 mmf., mica.
18. Oscillator fixed trimmer capacitor, 30 mmf., mica.
19. A. V. C. decoupling resistor, 1 M ohms.
20. A. V. C. load resistor, 1 M ohms.
21. First I. F. cathode resistor, 500 ohms.
22. Tone oscillator grid resistor, 50 K ohms.
23. First I. F. screen resistor, used only on C. W., 120 K ohms.
24. First I. F. screen resistor, 200 K ohms.
25. Tone oscillator grid coupling capacitor, .004 mf.
26. Tone oscillator tuning capacitor, .002 mf.
27. Tone oscillator plate decoupling resistor, 35 K ohms.
28. Second I. F. cathode resistor, 510 ohms.
29. Second I. F. screen divider resistor, 30 K ohms.
30. Second I. F. screen resistor, 91 K ohms.
31. Detector R. F. bypass capacitor, 300 mmf., mica.
32. Detector R. F. filter resistor, 50 K ohms.
33. Detector R. F. bypass capacitor, 300 mmf., mica.
34. Volume control and detector load, 500 K ohms, potentiometer.
35. Detector cathode resistor, 470 ohms.
36. Part of detector load, 1700 ohms.
37. Coupling capacitor to first audio grid, 400 mmf., mica.
38. Part of detector load, 10 K ohms.
39. First audio grid resistor, 1 M ohms.
40. First audio plate load resistor, 100 K ohms.
41. Coupling capacitor, first to second audio, 700 mmf., mica.
42. Second audio grid resistor, 500 K ohms.
43. Second audio cathode resistor, 900 ohms.
44. Second audio screen resistor, 70 K ohms.
45. Second audio plate bypass capacitor, .004 mf.
46. Audio output coupling capacitor, size unknown.
47. Headphone jacks.
48. 6R7 filament shunt resistor, 15 ohms.

NOTE: The above parts are not Soviet numbered. The numbers were assigned arbitrarily. The following parts have the numbers painted on them.

205. Oscillator trimmer capacitor.
237. Selector switch, 3-position.
247. R. F. amplifier manual-tuning trimmer capacitor.
249. Manual-tuning capacitor, 3 sections ganged.
250. R. F. amplifier fixed-tuning trimmer capacitor.
251. R. F. amplifier coil assembly, cap. 180 mmf., resistor 1 M ohms.
252. R. F. amplifier cathode capacitor, .01 mf.
253. R. F. amplifier screen bypass capacitor, .01 mf.
256. Mixer trimmer capacitor.
257. R. F. amplifier plate decoupling capacitor, .01 mf.
260. Mixer cathode capacitor, .01 mf.
261. Mixer screen bypass capacitor, .04 mf.
268. First I. F. cathode capacitor, .01 mf.
269. First I. F. screen bypass capacitor, .04 mf.
272. Tone oscillator plate decoupling capacitor, .04 mf.
280. Second audio cathode capacitor, .04 mf.
281. Second audio screen bypass capacitor, .04 mf.
284. Plate supply bypass capacitor, .25 mf.
286. Detector cathode bypass capacitor, .04 mf.
287. A. V. C. filter capacitor, .04 mf.
287. First I. F. transformer, 460 kc.
288. Second I. F. transformer, 460 kc.
289. Last I. F. transformer, 460 kc.
295. Tone oscillator transformer.
296. Audio output load impedance.
301. Voice—C. W. switch.
303. Second I. F. cathode bypass capacitor, .04 mf.
304. Mixer plate decoupling capacitor, .01 mf.
306. Power input socket.
306. Mixer input coil assembly, cap. 180 mmf., resistor 1 M ohms.
307. Plate supply bypass capacitor, .01 mf.
307. Local oscillator coil assembly, cap. 300 mmf., resistor 300 K ohms.
373. Second I. F. screen bypass capacitor, .04 mf.

Figure 91. Circuit diagram of receiver for radio station 10–R.

CHARACTERISTICS

Nomenclature	10–R.
Type	Tank transmitter-receiver.
Tubes	Xmtr: 1 G411 M. O. P. A. 1 G411 Mod. Rcvr: 1 6K7 R. F. 1 6A8 L. O. and mixer. 1 6A8 I. F. amp., CW osc and mixer. 1 6K7 I. F. amp. 1 6R7 Det. A. V. C., and 1st audio. 1 6F6 2d audio.
Frequency range	3.75–6 mc/s. (Nos. 150–240).
Type signal and range	Stationary: CW—30 miles. Voice—15 miles. Mobile: Voice—18 miles.
Type modulation	A. M.
Method of modulation	Plate.
Transmitter control	Xtal. (either of two preselected frequencies are available by turning the switch).
Power output	20 watts.
Power requirements	Xmtr: Fil.—12 v. Plate—Dynamotor RU–75. Rcvr: Fil.—12 v. Plate—Dynamotor RUN–10 or RU–11.
Power supply	Xmtr: Fil.—12 v. (tank battery). Plate—Dynamotor RU–75. Rcvr: Fil.—12 v. (tank battery). Plate—Dynamotor RUN–10 or RU–11.
Antenna	13 foot rod.
Tactical use	T–34 (medium) and old KV (heavy) tanks.

Dimensions and weight

Unit	*Size in inches*	*Weight in pounds*
Complete set	18 by 15 by 9½	65
Receiver	10½ by 6 by 8½	9¾
Transmitter	7⅜ by 8 by 8½	8
Power supply	7½ by 8 by 8½	16¾

c. Direction-finding equipment. Soviet direction-finding equipment (fig. 63) is of outmoded design. However, it does have fair accuracy.

d. Airborne. For Soviet airborne radio and electronic equipment, see chapter XI, Air Forces. Lend-lease and British aircraft sent to the U. S. S. R. were equipped with standard allied equipment and quantities of aircraft radios have been sent to the U. S. S. R. to equip aircraft manufactured by the Soviets.

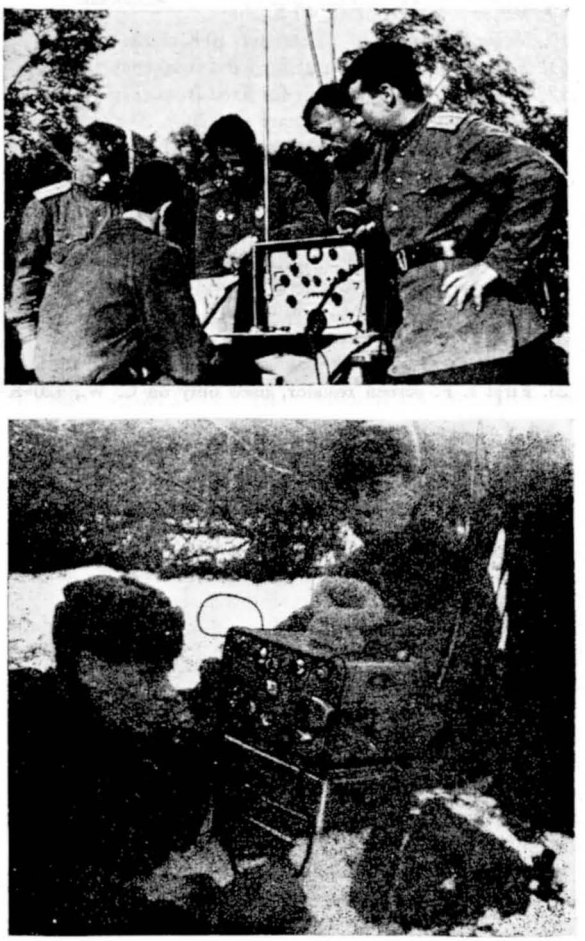


Figure 92.. Unidentified air-ground set (top). Unidentified radio set, possibly 13–RA (bottom).

Figure 93. Unidentified radio set, apparently widely used by lower echelons.

Section III. WIRE EQUIPMENT

1. TELEPHONES

Until 1928, the Red Army relied on imported field telephone designs manufactured in small quantities in the U. S. S. R. A great variety of these sets was obtained from the countries with which the U. S. S. R. had trade agreements. Thus, German, Swedish, Norwegian, Japanese, French, and the United States sets of early design were manufactured and still are used by the Red Army. For characteristics of Red Army telephones, see figure 94.

The Soviets introduced the UNA–F–28 with a buzzer and the UNA–I–28 with a magneto in 1928. These, with modifications UNA–F–31 and UNA–I–31, still are in wide use. Newer sets were introduced during World War II, including the more powerful TAM for rear echelon long-distance communication, but it is apparent that the Red Army relies heavily on the 380,000 field telephones furnished by the United States.

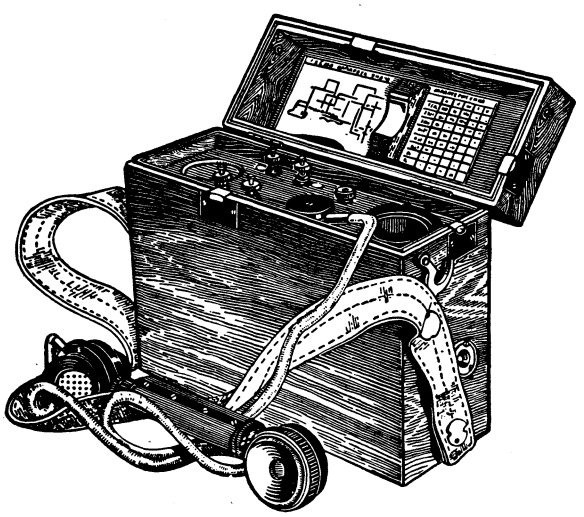
UNA–F–28. The UNA–F–28 (1928) (fig. 95) is fitted in a wooden box. It can be used on telegraph lines for voice communications simultaneously with the telegraph. By leaving the "PUSH-TO-TALK" switch in the "up" position, the receiver can be used to transmit up to 3 miles over good lines. Calling is accomplished by pushing the "CALL" button, which operates the buzzer connected in series with the primary of the transformer, and which produces an audible buzz in the headset of the called party. The line must be monitored constantly with the headset. The buzzer also is used as a telegraph key and, thus, takes the place of a small portable telegraph set. Range on field wire is limited to from 9 to 13 miles, and on pole-line permanent circuits to from 60 to 75 miles. The UNA–F–28 is used in infantry units from di-

Designation	Dimensions (inches)	Weight (pounds)	Range on field wire (miles)	Use and remarks
UNA–F–28	10.8 by 8.7 by 3.9	8	10	Regiment, battalion, and company. Uses buzzer for calling.
UNA–F–31	11.1 by 9.36 by 3.9	7.48	10	Regiment, battalion, and company. Uses buzzer for calling.
UNA–I–28	11.7 by 8.16 by 4.5	12.54	10	Army corps and division. Uses magneto for calling.
UNA–I–31	11.2 by 9.3 by 4.5	12.4	12	Army corps and higher. Uses magneto for calling.
TAM	14 by 8.5 by 5.3	16.5	15	Higher staffs.
TAT–F	Hand set, small box, and ground stake.	3.3	10	Paratroops.
F–41	11.2 by 6 by 4	6	12	Battalion. Developed from UNA–F–31.
TABIP–1 and –2	10 by 6 by 4	10	10	Company.
TAI–43			15	Higher staffs. Manufactured in 1943.
UNA–I–42				
UNA–I–43				

Figure 94. Characteristics of telephones.

vision down through company; in cavalry from division through troop; and in artillery from battery to regiment. It is used as a telegraph in corps, army, and army group. The UNA–F–28 employs a 2.4-volt battery, which is used continuously so long as a line is connected to the set.

UNA–I–28. The UNA–I–28 (1928) (fig. 96) has approximately the same characteristics as the UNA–F–28. Main differences are the use of a magneto for calling and a bell instead of a buzzer for signaling. This unit rarely is used on telegraph lines simultaneously with the telegraph because of interference from the magneto. The line must be monitored continuously. A 1.5 μf. condenser must be inserted in series in the line. Should the transmitter become damaged, the receiver may be used as a transmitter by depressing the button. The battery is used only when the telephone is in actual operation. The UNA–I–28 is used in armies, corps, and divisions.



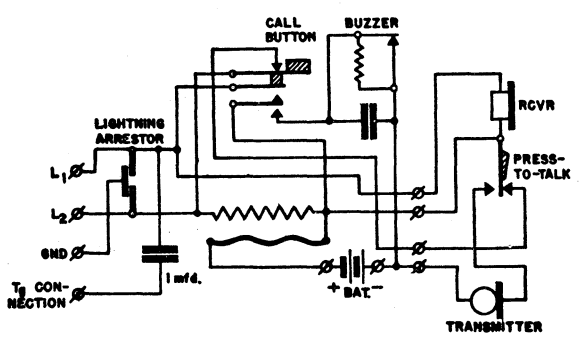


Figure 95. UNA–F–28 field telephone.

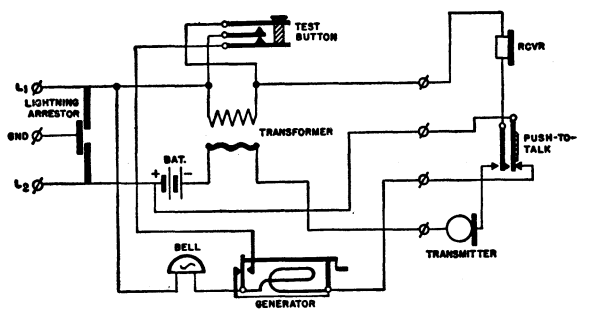


Figure 96. UNA–I–28 field telephone.

UNA–F–31. The tactical and technical characteristics of the UNA–F–31 (1931) (fig. 97) are the same as those of the UNA–F–28, with exception of size, type of handset, a better transformer, and a more efficient buzzer. The buzzer in the UNA–F–31 utilizes the primary of the transformer. Both alternating and direct current flow through the transformer.

UNA–I–31. The UNA–I–31 (1931) (fig. 98) compares to the UNA–I–28 in much the same manner as the UNA–F–31 compares to the UNA–F–28. Minor improvements include a transformer with much better electromagnetic qualities, a more modern hand set, a stronger magneto, and a more sensitive ringing circuit. In all other respects, the UNA–I–31 corresponds to the UNA–I–28.

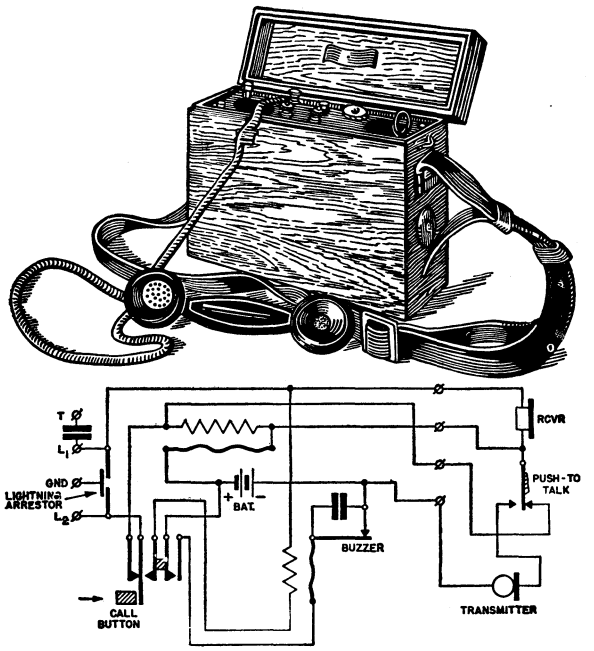


Figure 97. UNA–F–31 field telephone.

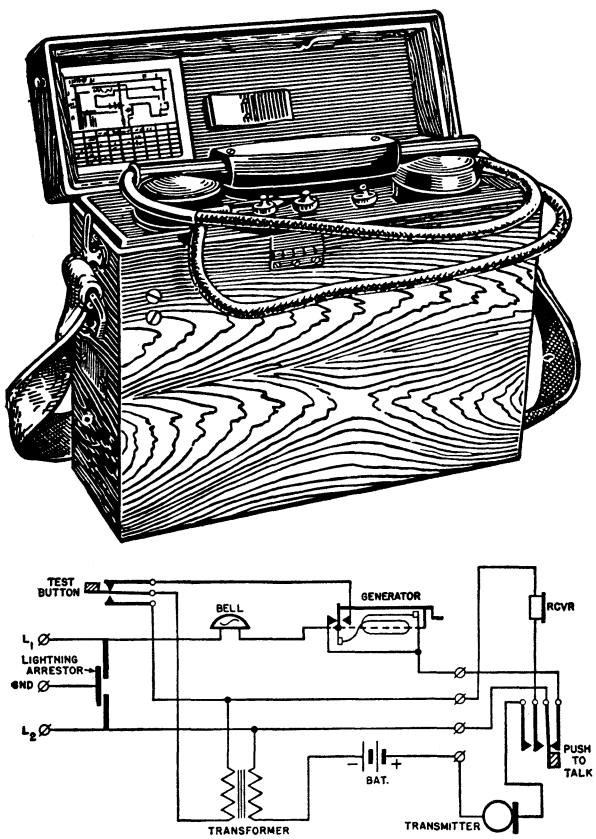


Figure 98. UNA–1–31 field telephone.

F–41. The F–41 (1941) (fig. 99) is a small, portable field telephone for use at battalion level. Because ground return is forbidden by SOP, it is used on metallic circuits only. It utilizes a buzzer for calling and can be used as a telegraph or in a telegraph line. Operating distance on field wire is limited to from 9 to 11 miles. But, on steel, open-wire construction (permanent), it will operate from 60 to 70 miles. The F–41 uses a dry battery, type ZS (1.4 v).

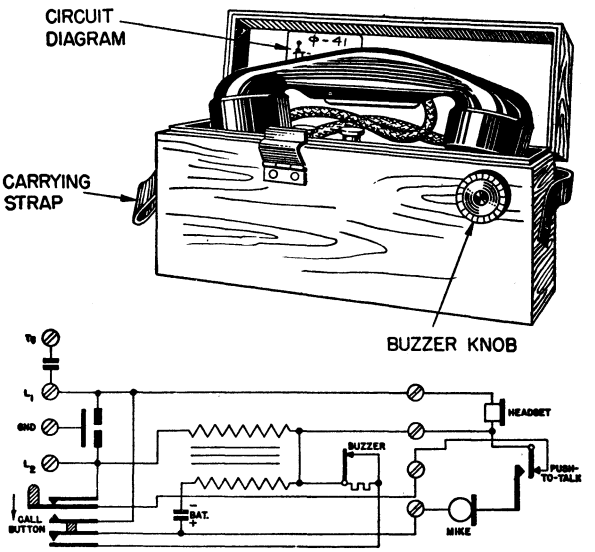


Figure 99. F–41 field telephone.

CHARACTERISTICS

Receiver	1,700 turns, 1 mm in diameter, 130 ohms.
Transmitter	30 ohms, buzzer transformer.
Buzzer transformer:	
Primary	275 turns, 0.41 mm. diameter, 275 ohms.
Secondary	2,250 turns, 0.17 mm. diameter, 2,250 ohms.
Battery	1.5 v. 0.2 ohm internal resistance.
Condenser	0.3 μf., spark quench R=1,000 ohms.

The microphone capsule of the F–41 is not interchangeable with that of the UNA–F–41.

"Ordonance." The "Ordonance" telephone (fig. 100) is used in the artillery units of the Red Army. It is a complicated, obsolescent telephone. Buttons on the handset must be depressed for either talking or listening. It is not used ordinarily on telegraph lines, and when it is used, it must be connected in series with a 1–1.5 μf. condenser. The "Ordo-

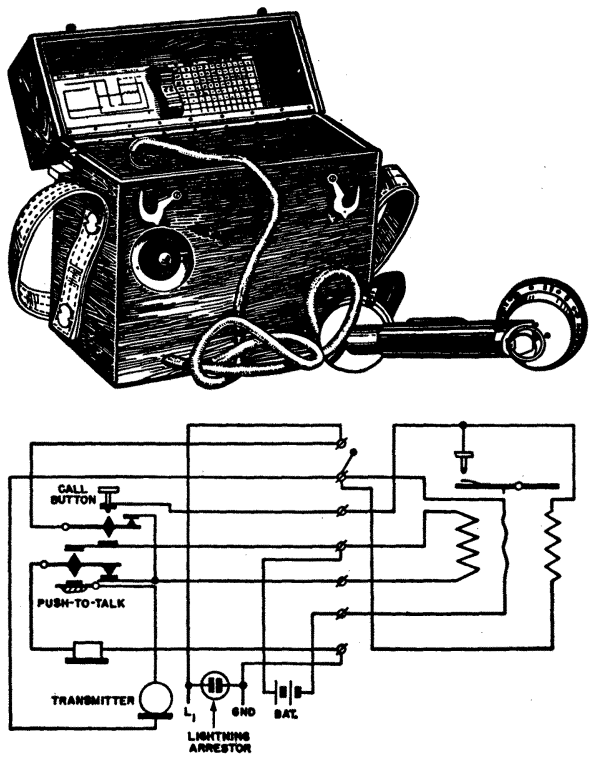


Figure 100. "Ordonance" field telephone.

nance" is approximately the same size as the UNA–F and –1 series.

TAT–F. The TAT–F (figs. 101 and 102) is used by paratroops. It utilizes 2 batteries, type BAS, and the handset, type UNA.

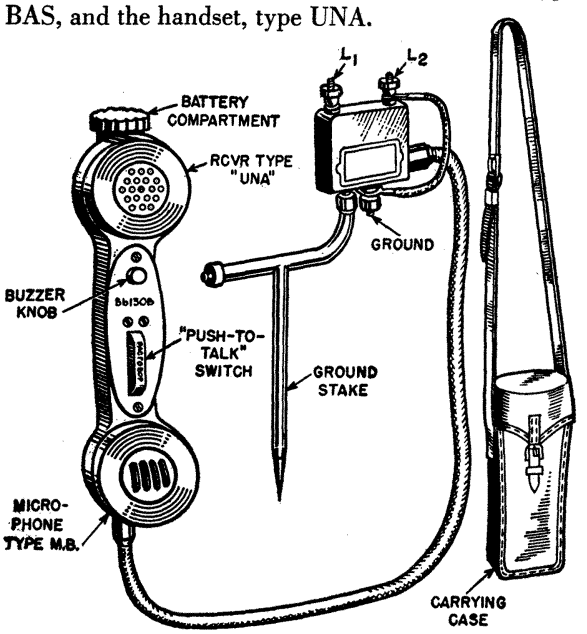


Figure 101. TAT–F field telephone.

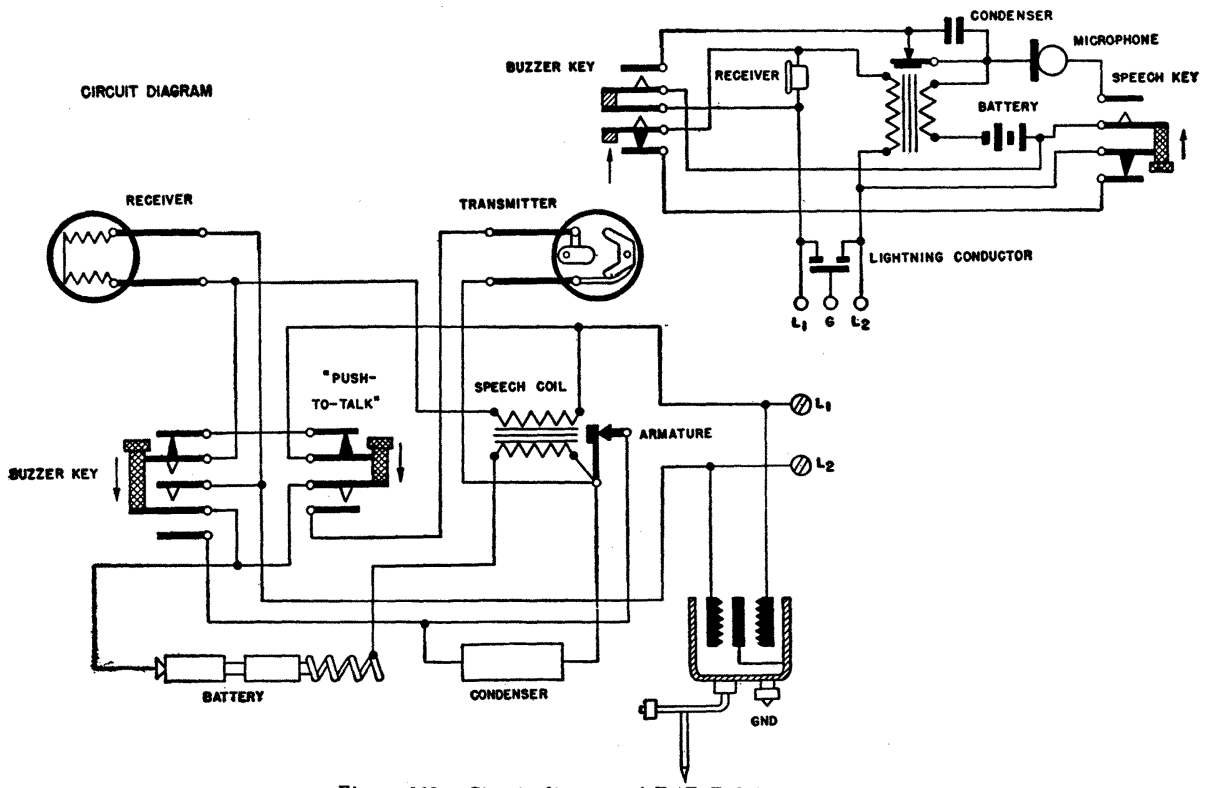


Figure 102. Circuit diagram of TAT–F field telephone.

CHARACTERISTICS

Receiver ------- 1,700 turns, 0.1 mm. diameter, 120 ohms.
Transmitter ---- Type MB, 50 ohms (20 to 60 ohms).
Buzzer transformer:
  Primary------ 270 turns, 0.41 mm. diameter, 1.5 ohms.
  Secondary---- 1,370 turns, 0.2 mm. diameter, 38 ohms.
Battery -------- 2.9 v., 0.4 ohm interval resistance.
Spark quench condenser. Type BK, 0.1 μf.

TAM. The TAM (figs. 103 and 104) is used with common battery and local battery installations. It utilizes either voice signaling or magneto ringer. It can be used with other TAM's or any normal local battery phone. Its differential microphone, type DM, is of excellent quality and uses a 6-volt battery (wet or dry). The set is unusual in that sidetone can be adjusted to compensate for different conductors, iron or copper. Balanced resistors are switched in or out, adjusting the sidetone to normal level. The TAM also can be used in a telegraph line for phone communication. The working distance over field wire is 15 miles, and up to 150 miles over permanent pole-line construction.

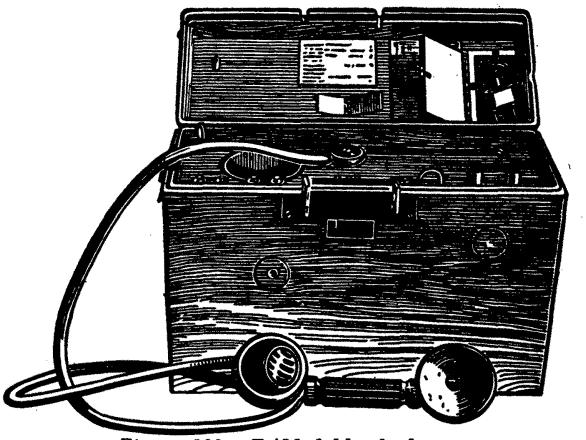


Figure 103. TAM field telephone.

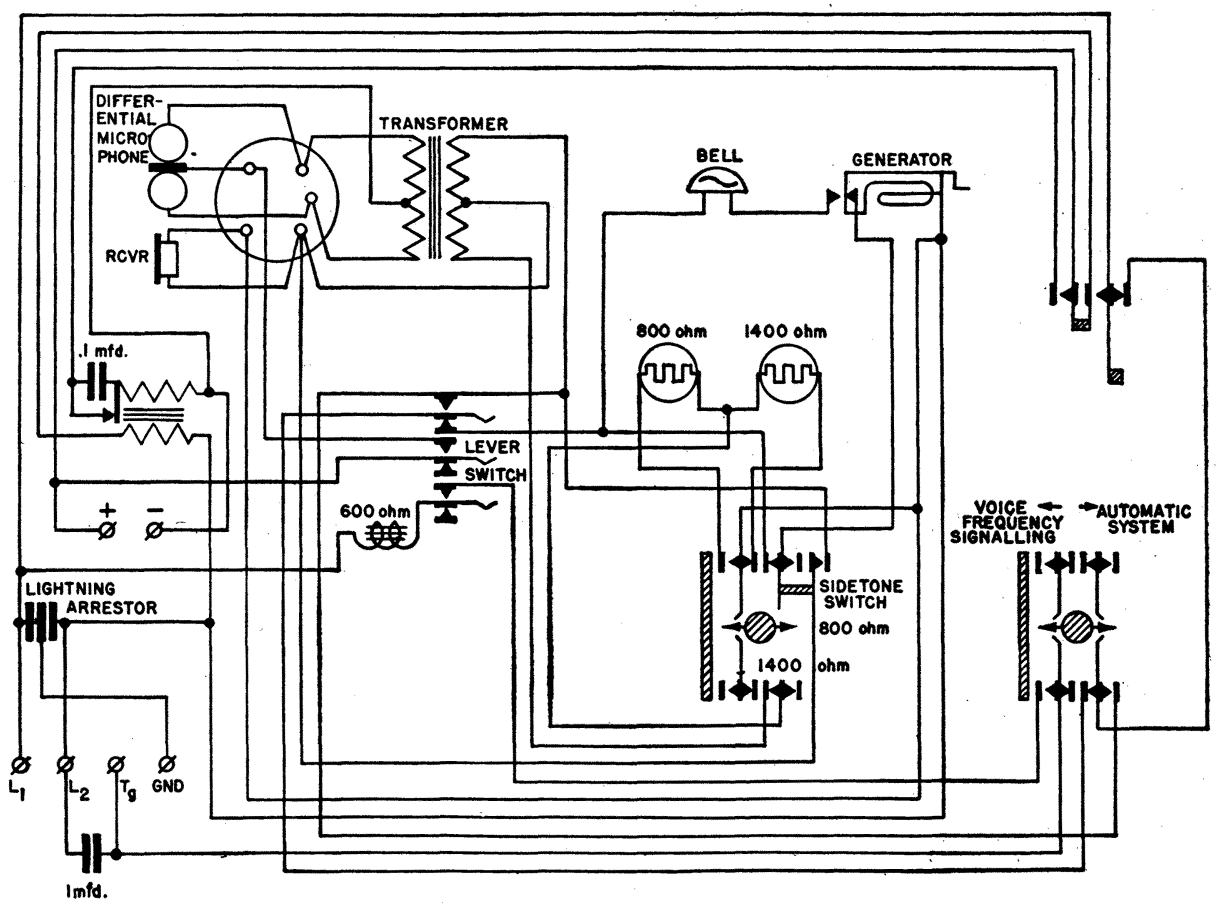
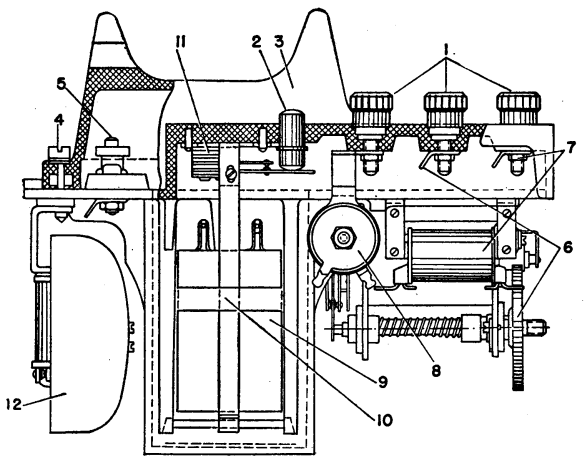


Figure 104. Circuit diagram of TAM field telephone.



1. L_1, L_2, ground.
2. Shunting button.
3. Handset rest.
4. Locking screw.
5. Battery post.
6. Tp autotransformer.
7. Lightning arrestor.
8. Condenser.
9. Battery.
10. Battery straps.
11. Coil.
12. Bell.

Figure 105. TAI–43 field telephone.

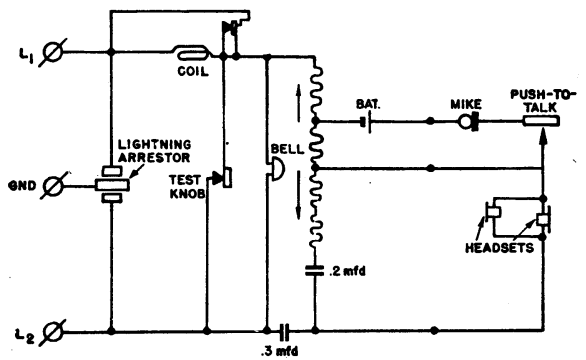


Figure 106. Circuit diagram of TAI–43 field telephone.

TAI–43. The main components of the TAI–43 (figs. 105 and 106) are a wooden or plastic box, a plastic handset with two "PUSH-TO-TALK" switches, and a cord and plug on the handset which contains two additional jacks for auxiliary telephones. The unit is issued with a supplementary "one earphone" type telephone and soft headband complete with cord and plug. Posts for L_1, L_2, and ground, a shunting knob, three headset jacks, and a headset support, which also serves as a battery lid, are positioned on the top of the case.

The circuit of the TAI–43 basically is the same as that of the UNA–I–43, except for the provision of jacks for auxiliary headsets. It has a more modern circuit and better reception than the UNA–I–42. As in the UNA–I–43, microphone current is obtained from one battery type 3–S or 3–V. The TAI–43 utilizes microphone capsules MB–5 and MK–15. The latter is of more recent design and gives better performance. The receiver also is the capsule type, and has very high sensitivity.

The TAI–43 normally has no sidetone when connected to a line. However, when the line is open or when the set is not connected, testing for sidetone may be accomplished by. blowing in the transmitter. Because the receiver always is in the line when the "PUSH-TO-TALK" button is pressed, troops are cautioned to be careful of their conversation when the set is in use. Even though the transmitter is covered, the receiver will pick up and transmit conversation over the line.

According to official Soviet statements, the range of the TAI–43 is superior to all other magneto-

Designation	Number subscribers	Dimensions (inches)	Weight (pounds)	Use and remarks
KOF–28	6	6.2 by 5.73 by 1.3	3 (less case)	Subscriber's call goes into all lines. Difficult to determine which one is calling.
KOF–33	6	8.5 by 6.2 by 3.2	5	Minor modifications and improvements over KOF–28.
R–16 (?)	6	13 by 11 by 8	35	Newer model. Very efficient.
RE–12	12	16 by 8.9 by 6.4	13	Similar to above, but larger. Rifle and cavalry division and regiment.
R–20	22	20.6 by 13.2 by 19.5	60	Provision for 20 local subscribers, 1 line to a common battery board, and 1 line to a dial board. Infantry corps and division.
R–60	60	22 by 22 by 25	154	Higher echelons.
"Nomernik"	12	7.5 by 6.8 by 3.3	9.2	Used in conjunction with magneto type switchboards.

Figure 107. Soviet switchboards.

type telephones, including the United States EE–8A. Normal voice range is constant and dependable with a line attenuation of 5 nepers. Communication is dependable over up to 15 miles of field cable type PTF–7, and up to 105 miles over 4-mm. permanent construction pole line. The TAI–43 may be transported easily, and will give dependable communication through a temperature range of from −40° C. to +50° C. and in up to 95 percent humidity. It is approximately the same size as the UNA–F series.

2. SWITCHBOARDS

The Red Army still retains some early switchboards of European design. It also uses the following switchboards (fig. 107) of Soviet manufacture:

KOF–28 (6 lines).
KOF–33 (6 lines).
RE–12 (12 lines).
R–16 (?) (6 lines).
R–20 (20 lines).
R–60 (60 lines).
"NOMERNIK" (12 lines).

The two larger boards have facilities for central battery and dial operation.

KOF–28. The KOF–28 (1928) (figs. 108 and 109) is a six-line board encased in a metal box. Six two-wire lines or ground return may be used satisfactorily. Three different calls may be handled simultaneously, or up to six on a conference call. The calling party's signal goes into all "call levers" (drops), rendering identification difficult. It is necessary for all subscribers, as well as the switchboard operator, to monitor the line continuously. The KOF–28 is light, sturdily-constructed, and easy to set up. It is used in machine gun companies, in battalions, and in artillery and cavalry units. It measures 6.2 by 5.7 by 5.2 inches and weighs 3 pounds, less case.

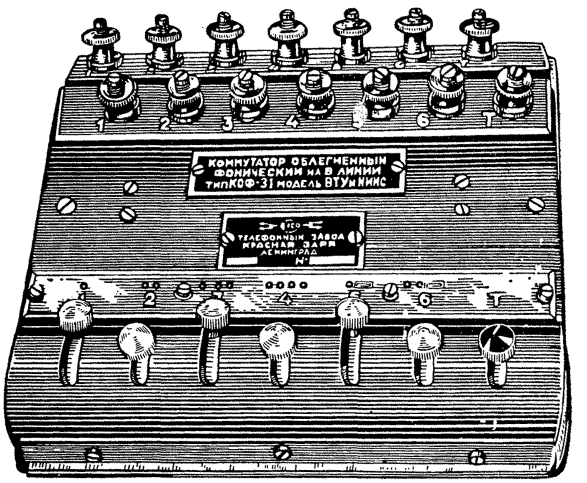


Figure 108. KOF–28 six-line switchboard.

KOF–33. The KOF–33 (1933) (figs. 110, 111, and 112) switchboard is a later, more compact model of the KOF–28. It is a six-line board, with

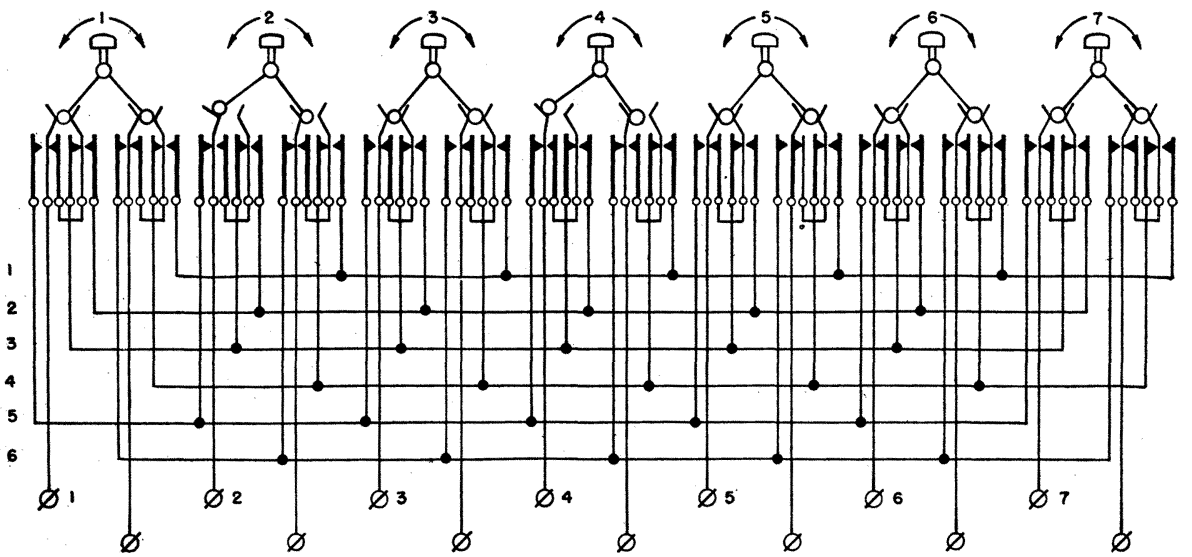


Figure 109. Circuit diagram of KOF–28 six-line switchboard.

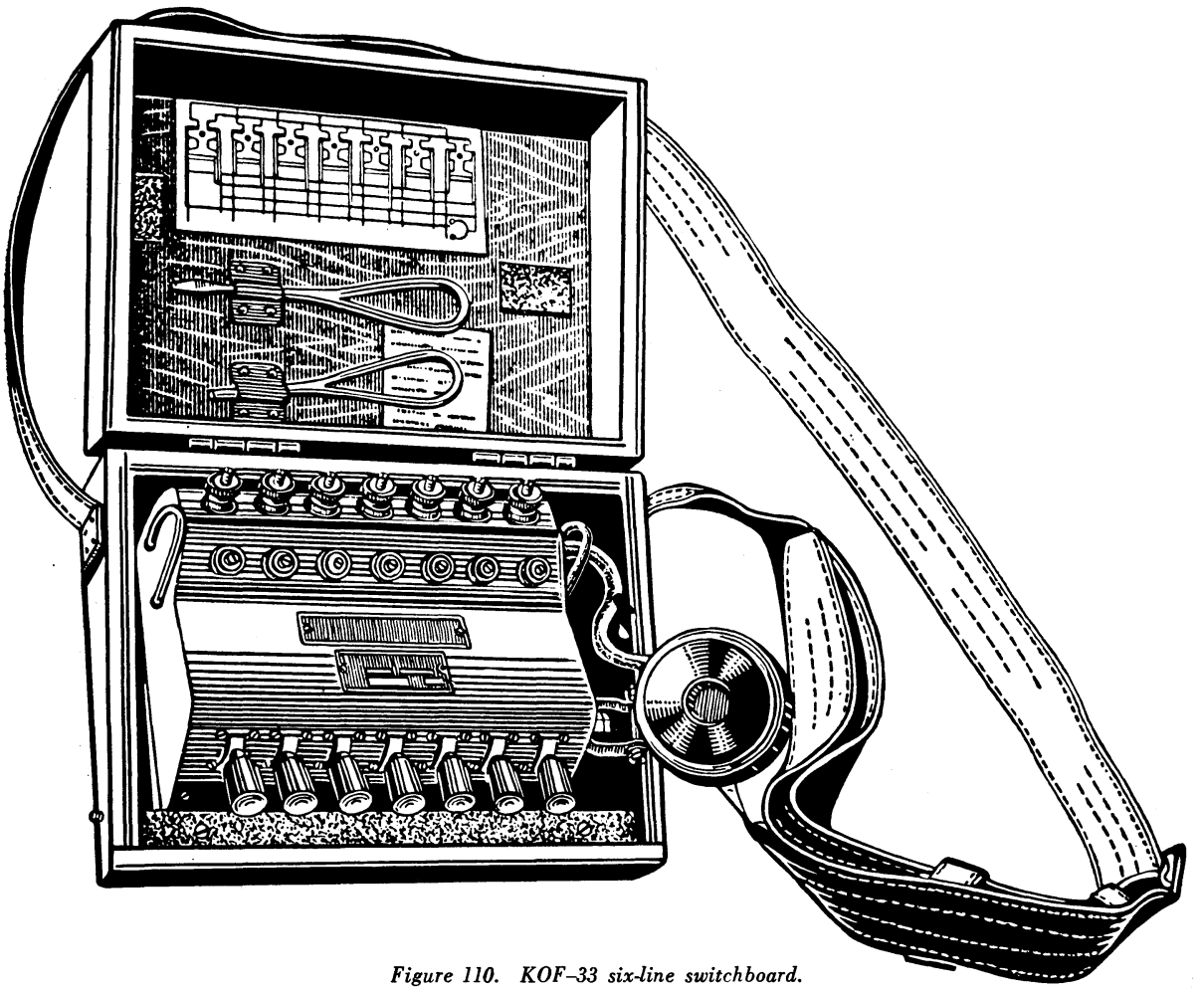


Figure 110. KOF–33 six-line switchboard.

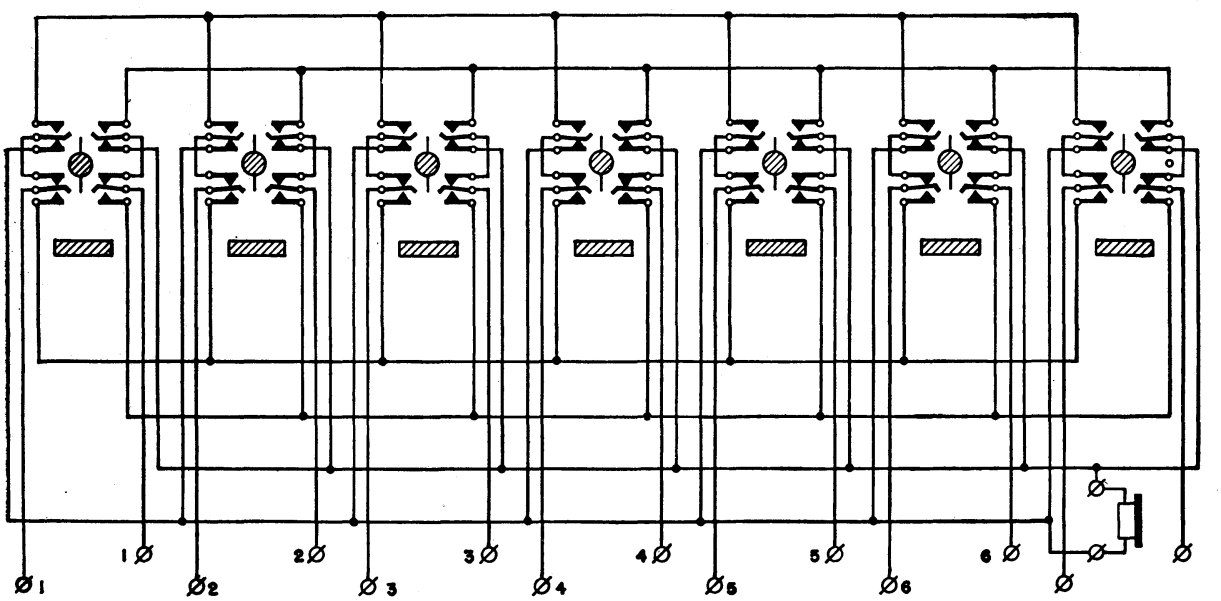


Figure 111. Circuit diagram of KOF–33 six-line switchboard.

Figure 112. KOF–33 switchboard attached to UNA–I–33 telephone.

an additional circuit for trunk calls and the operators monitoring set plugged into two clamps located in the right rear of the set. The board can handle three local calls simultaneously, or up to seven, including the trunk, on conference calls. As in the KOF–28, no indicator is incorporated, and constant monitoring is necessary. It is used in machine gun companies, in battalions, and in artillery and cavalry units. The KOF–33 measures 8.5 by 6.2 by 3.2 inches and weighs 5.3 pounds with case.

R–16 (?). A six-line, three-call cordless switchboard (fig. 113) for local battery operation, believed to be the R–16, has been identified. It weighs approximately 35 pounds and measures 13 by 11 by 8 inches. It is well-constructed, with all wiring laced and taped. Most of the metal used is aluminum.

There are four switches near the top of the set. The left-hand switch, "BELL," connects and disconnects the bell. The switch to the left of center, "LIGHT," controls the white panel light. The switch to the right of center, "RELEASE," turns off the call lights and bell, and normally is in the "on" position. The right-hand switch, "AMPLIFIER," transfers the operator's circuit to the terminal marked "AMP." During normal operation, the switches to the left are in the "off" position, and those on the right in the "on" position. A red light to the left of the center of the board lights when the fuze burns out. There then is no operating voltage in the set. The white panel light is located in the center of the panel. The green light to the right of center should light only when a subscriber is being called. Simultaneously, the indicator lamp of the subscriber's circuit lights up, and remains lighted until the selector switch for that circuit is moved or until the "RELEASE" is opened. If the line being called is shorted, the green lamp will light but the indicator light will not. If the line being called is open, the indicator light will come on but the green light will not.

A row of six white lights contains the indicator lights for each line. The indicator light for a line should light whenever a ringing signal is applied to the line from either end, except when the selector switch for that line is in the "O" position. The indicator light will stay lighted until the selector switch is moved, or until the "RELEASE" switch is opened. If the "BELL" switch is closed, the bell will ring as long as an indicator is lighted. The six selector switches for the six subscriber circuits are black and the operator's selector switch is red. All switches are normally in the "И" position. When the switches are in this position, each line is connected only to its associated relay. A ring signal then will energize the relay, which will lock closed, and the indicator will light. Moving the selector switch to position "O" extinguishes the indicator light, connects the line to the operator's handset, and applies voltage to the transmitter of the operator's handset. Position "B" connects the line to the generator, and is the position the operator uses when calling a circuit. Positions "1," "2," and "3" are buses common to all selector switches and are used to complete the circuit between different lines. Lines whose selector switches are in the same numbered position are connected to each other. "И," "O," and "B" positions of

the operator's selector switches have no connections. The "1," "2," and "3" positions connect the handset to the corresponding buses and apply voltage to the transmitter, thus allowing the operator to talk or listen on any connection set up on the board. When the "AMPLIFIER" switch is closed, the operator's circuit (not his handset) is connected to the "AMP" terminals. A regular field telephone connected to the "AMP" terminal then could serve as an operator's set. It also is possible to connect the "AMP" terminals to one pair of line terminals of another similar switchboard. One operator then could handle both boards. It is to be noted, however, that if a call were to be made from board to board, the operator would lose control of the first board.

RE–12. The RE–12 (figs. 114 and 115) is a 12-line board carried in a wooden case. It is used in regimental CP's. It is capable of handling six simultaneously two-way conversations, or up to 12 subscribers on a conference call. It can be paralleled easily with KOF, other RE–12, and R–20 boards. The RE–12 measures 15.9 by 8.9 by 6.4 inches. It weighs 17.6 pounds. The switchboard alone weighs 13.2 pounds.

R–20. The R–20 (figs. 116 and 117) is a field, magneto-type switchboard. It accommodates 22 lines. Twenty lines are for local subscribers, one is for a common battery line, and one for a dial system line. The board will handle six calls simultaneously, or five subscribers on a conference call without monitoring The R–20 requires a three-man crew for normal, quick installation. It measures 20.7 by 14.2 by 19.5 inches and weighs 70.8 pounds. Test set RD–1 is used on the R–20.

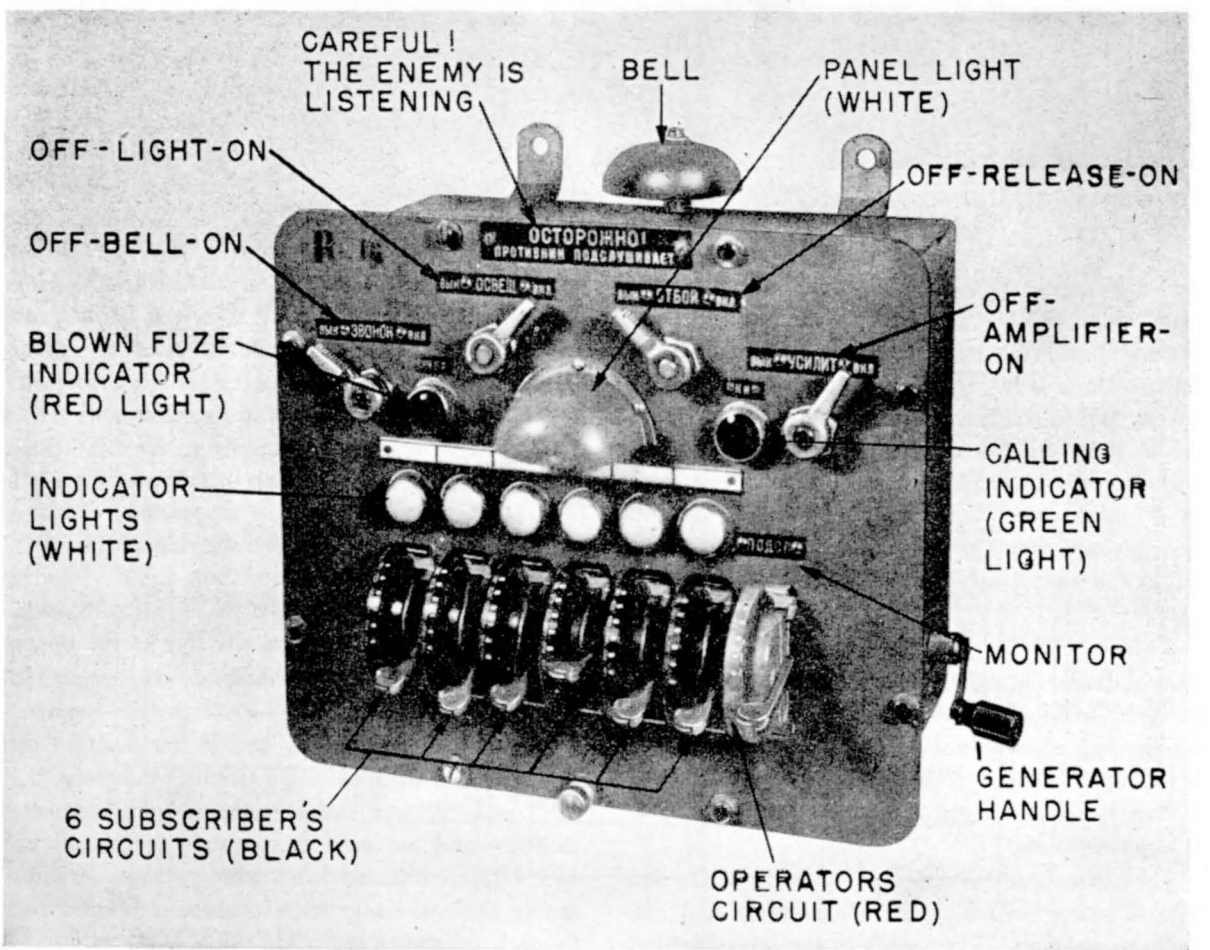
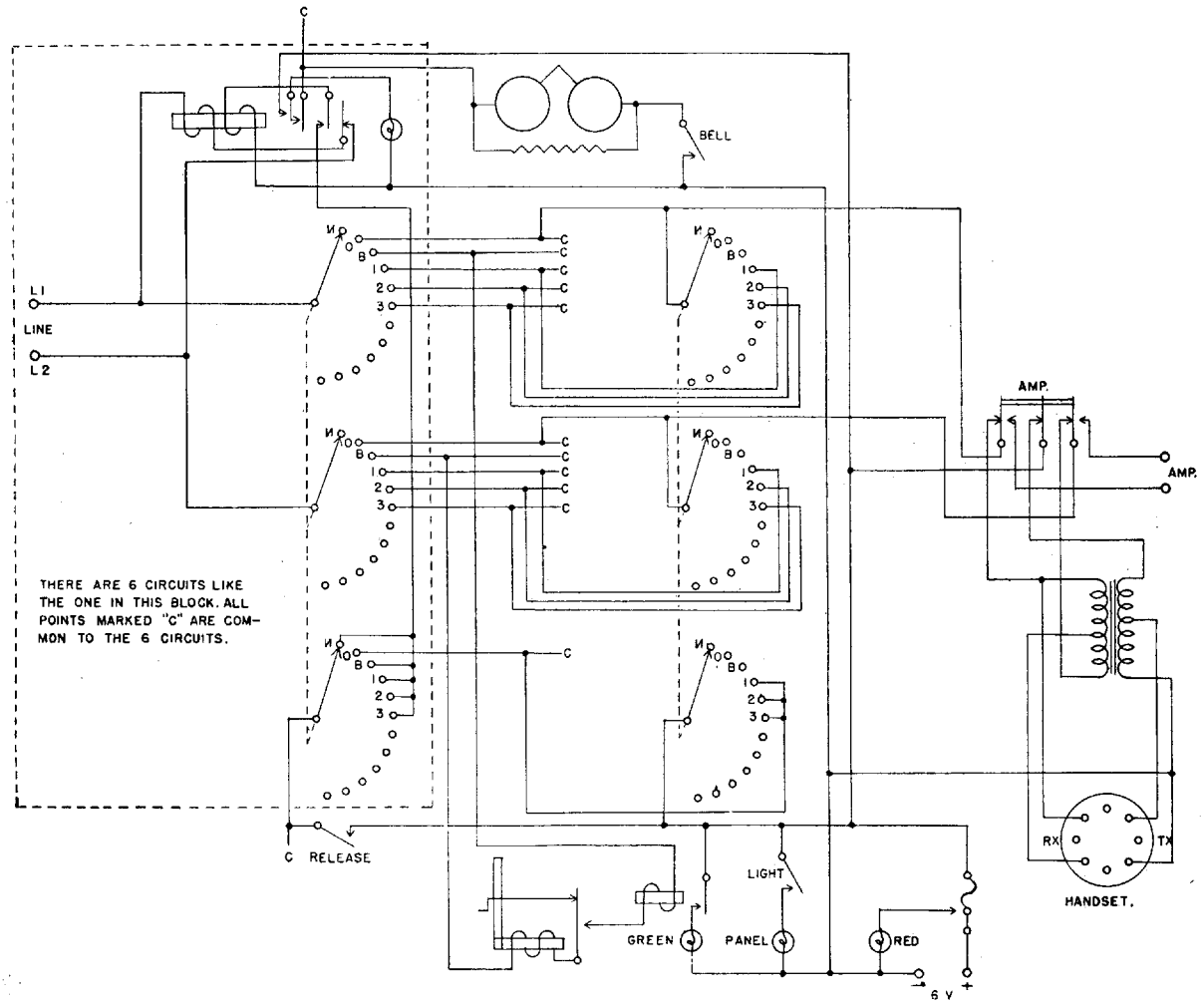


Figure 113. Six-line cordless switchboard, believed to be R–16.



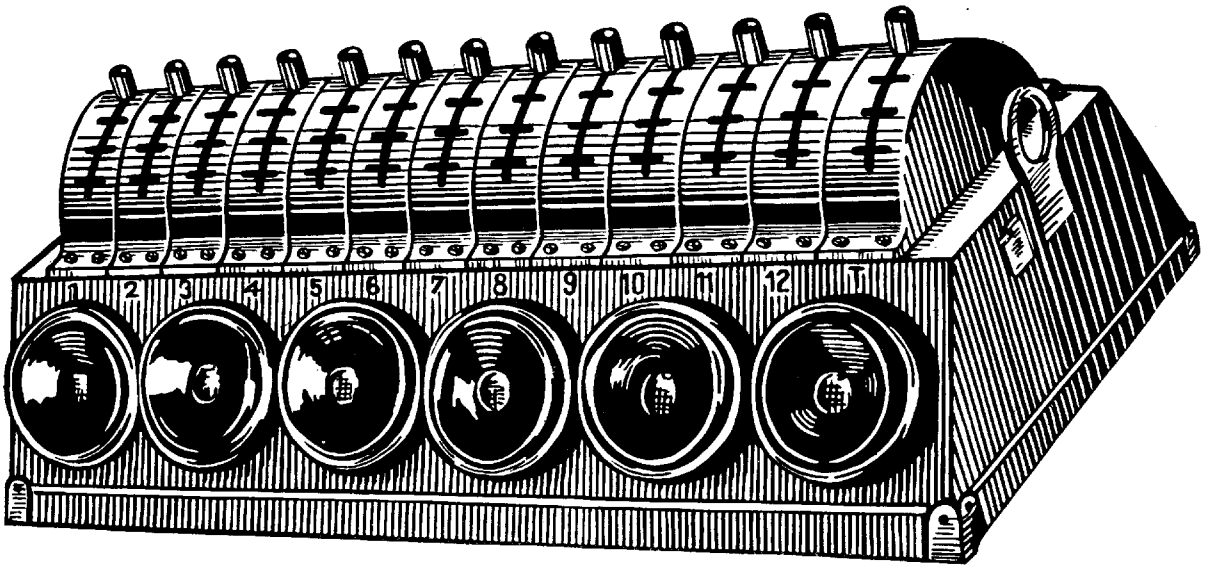


Figure 114. RE–12 switchboard.

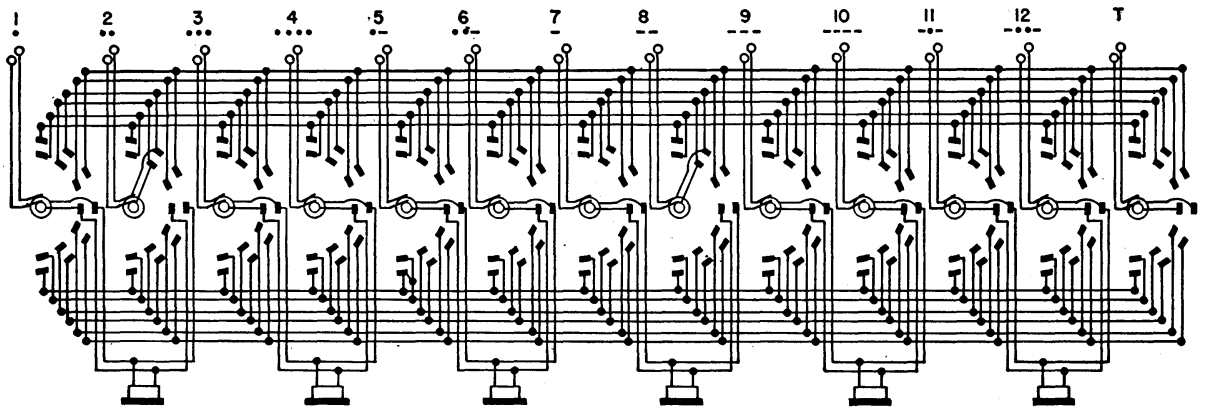


Figure 115. Circuit diagram of RE–12 switchboard.

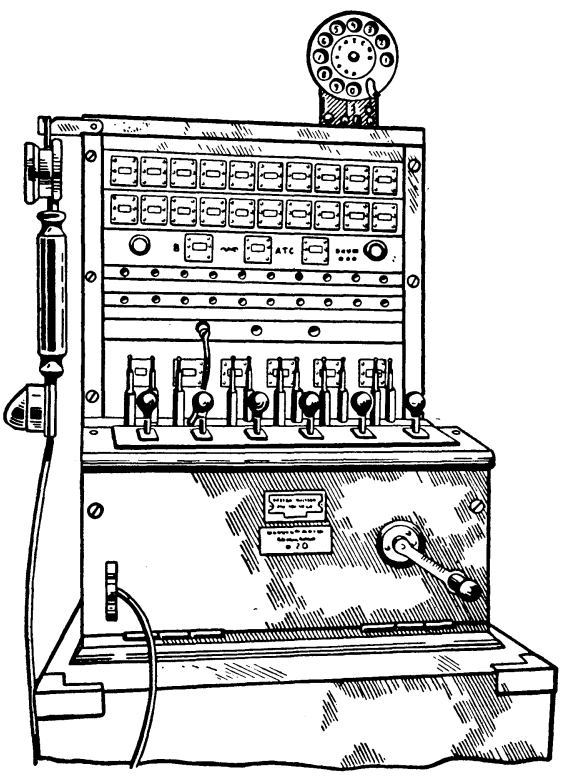


Figure 116. R–20 switchboard.

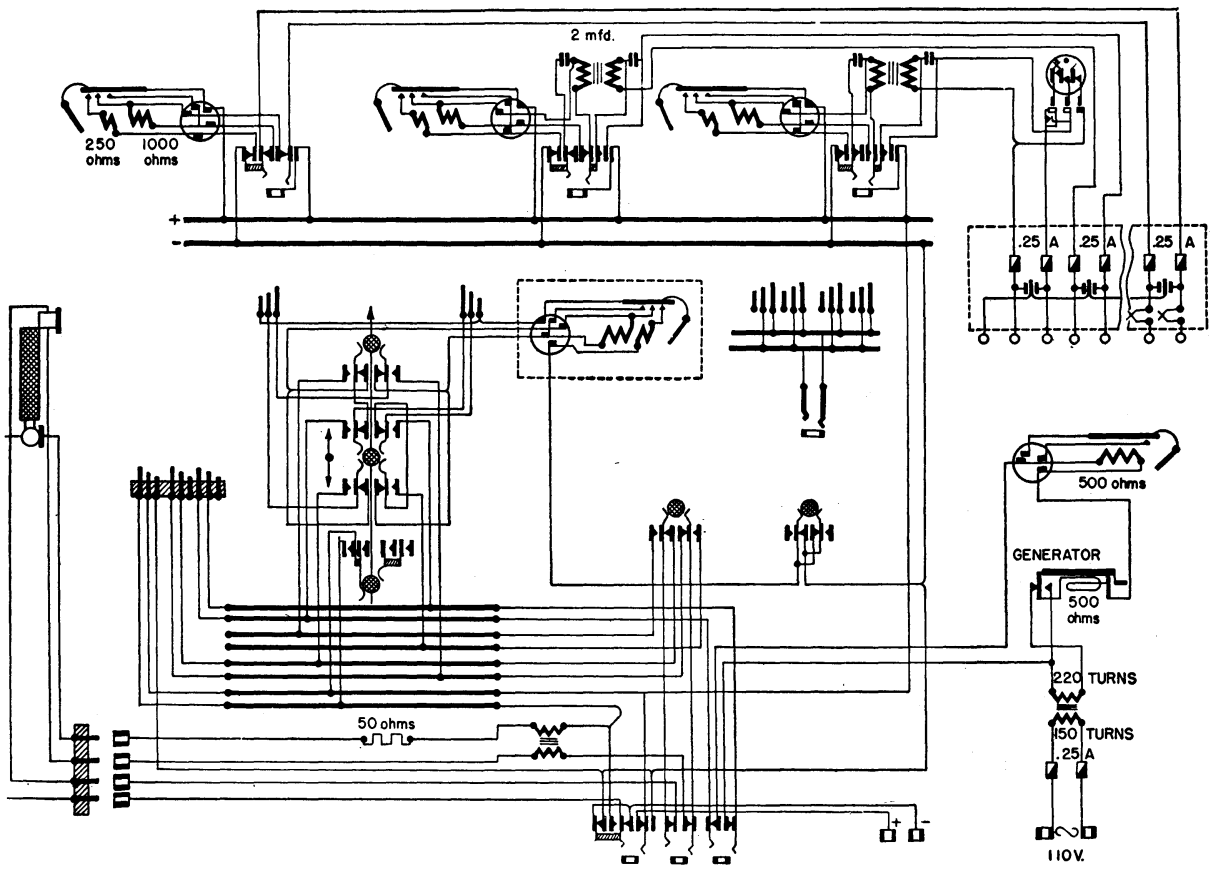


Figure 117. Circuit diagram of R–20 switchboard.

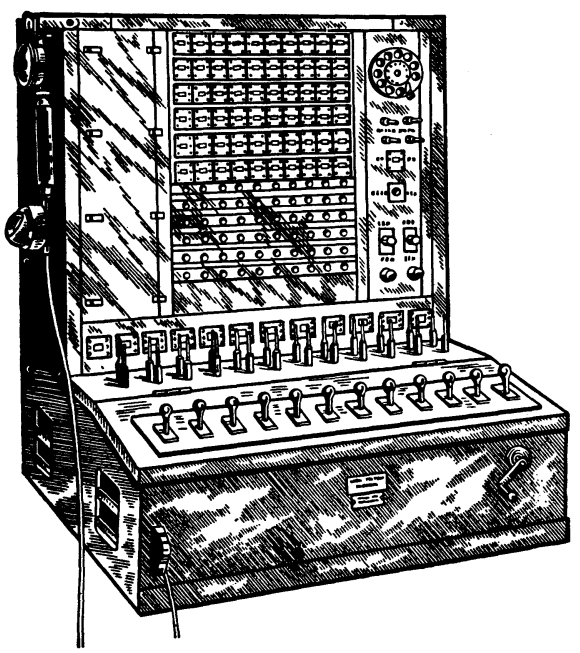


Figure 118. R–60 switchboard.

R–60. The R–60 (fig. 118) is the same type board as the R–20. Differences are the size, weight, and tactical allocation. The R–60 has provision for 60 lines, 50 of which are for local subscribers, 10 (Nos. 51 through 60) are used for ground return. However, 5 (Nos. 56 through 60) can be used to connect the R–60 to common battery and automatic systems. All 60 lines can be used for metallic circuits. All ground return circuits through the R–60 can be connected directly without additional transformers. Test set RD–1 is used on the R–60. The R–60 measures 21.5 by 21.5 by 25.4 inches and weighs 154 pounds.

"Nomernik." The "Nomernik" (fig. 119) resembles a trunk switchboard, but is designed for local subscriber use in larger command posts. It can accommodate 12 subscribers. It can be used only with magneto-type phones.

Automatic Systems. Two automatic telephone systems, the TsB and the ATS, have been identified. The TsB x 2 switchboard (figs. 120 and 121) is

used with the TsB system (fig. 122). It can accommodate up to 50 subscribers and utilizes common battery operation with a 24-volt lead-acid battery. Metallic circuits generally are used.

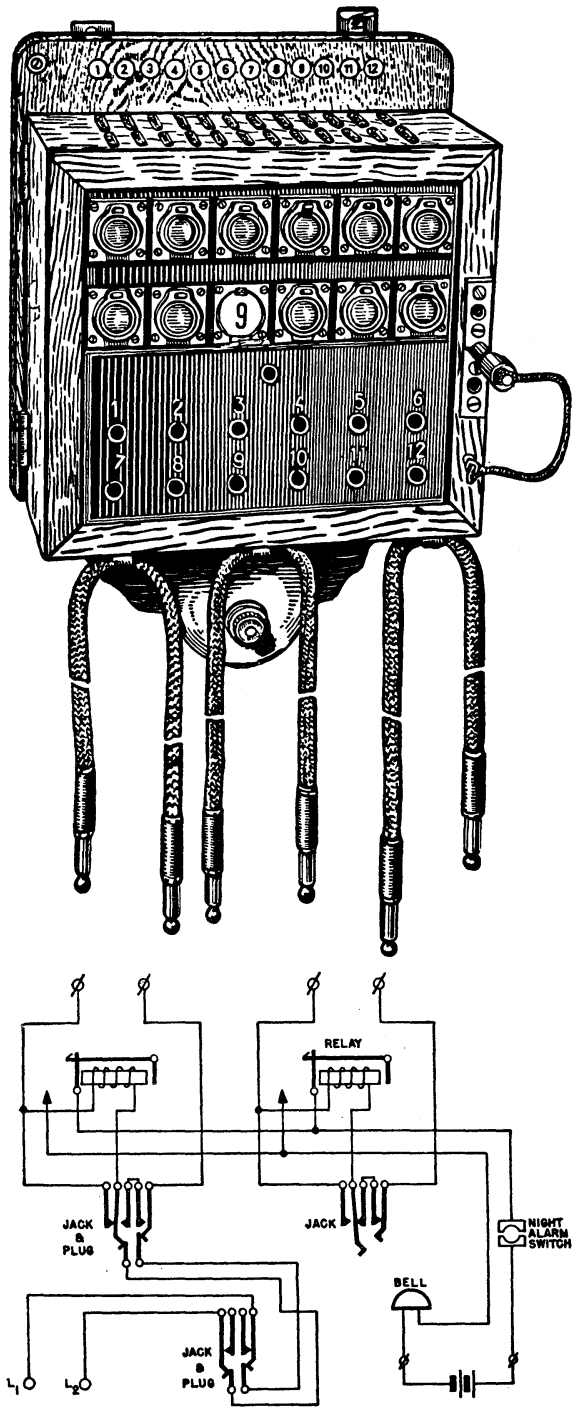


Figure 119. "Nomernik" switchboard.

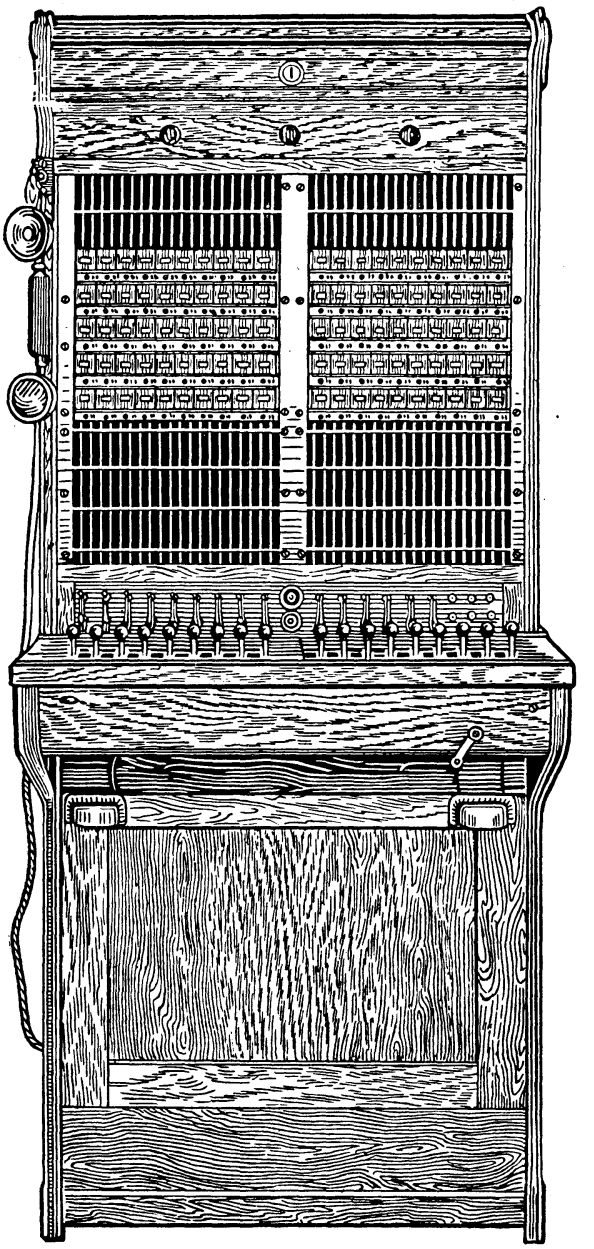


Figure 120. TsB x 2 switchboard.

Lifting the phone from the hook automatically calls the operator. The TsB can be connected with the ATS system, and it occasionally is considered as a regular sub-station of the ATS system.

The ATS system appears to be a modern automatic telephone system. It utilizes a 48-volt common battery and will accommodate more than 50 subscribers.

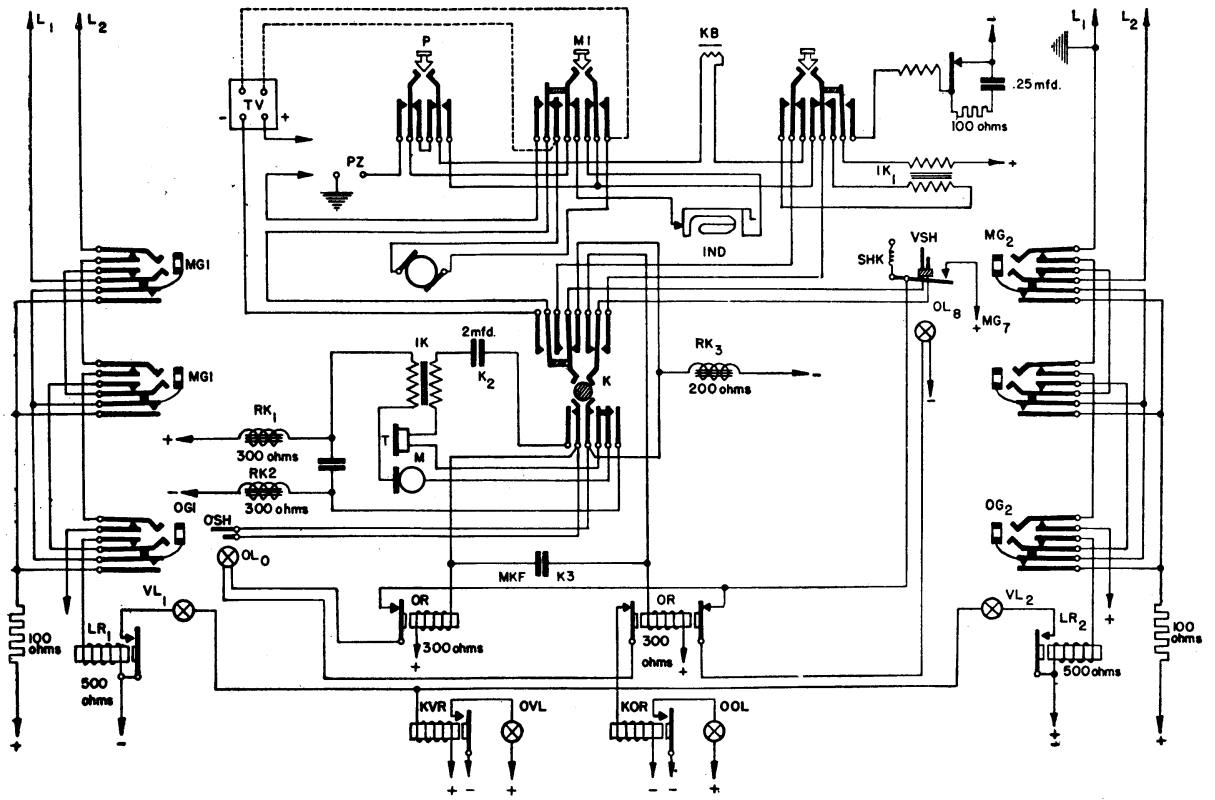


Figure 121. Circuit diagram of TsB x 2 switchboard.

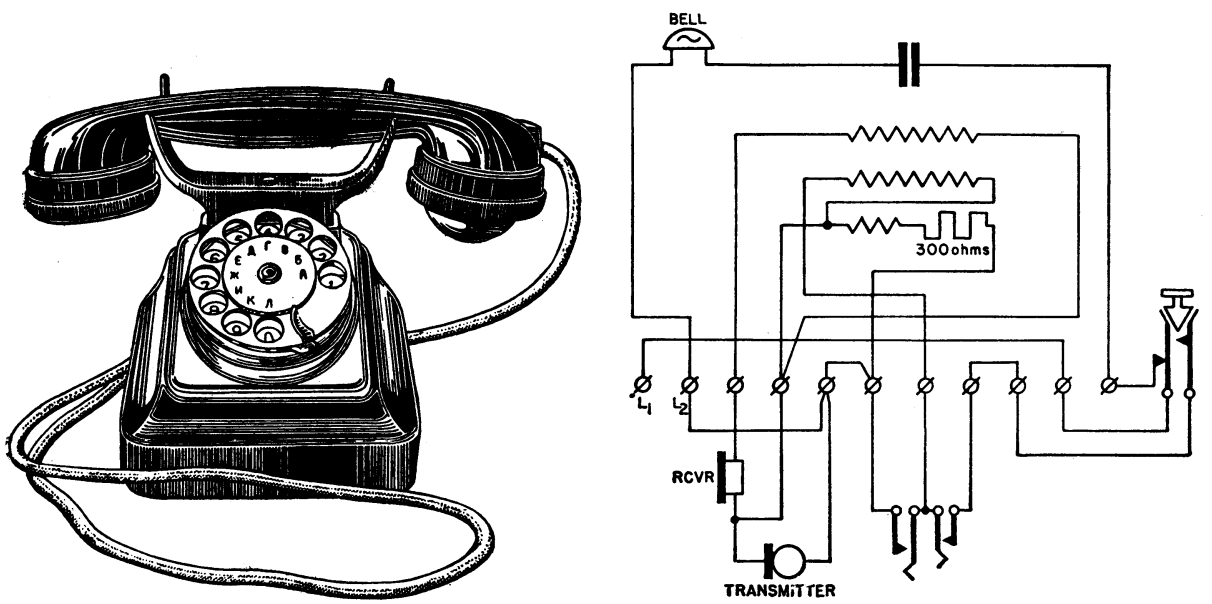


Figure 122. TsB telephone for use with a TsB x 2 switchboard.

3. TELEGRAPHS

A line field telegraph unit is used in conjunction with field telephones. Field telephones are fitted for buzzer communication and, probably, are used widely as a substitute for the telegraph at lower echelons. Above corps level, tape recorders of the Hughes or Baudot types are used. In areas farther to the rear, Soviet-built teletypewriters, copies of the Schorin and the Treml, are utilized.

4. LINE EQUIPMENT

a. Wire. The standard field wire has two copper and five steel strands with rubber and fabric insulation. Over-all diameter is 3 millimeters. It is supplied in 1,094-yard lengths, which weigh approximately 30 pounds. The double wire consists of two of these single wires, and is supplied in 547-yard lengths, which weigh approximately 30 pounds.

A lighter, double wire, weighing approximately 40 pounds per 1,094 yards, is used for telephone-telegraph communication. Each line consists of seven steel strands and one copper strand.

Open wire is used above corps level. It may be copper of 2.1-, 3-, or 4-millimeters or, more commonly, iron of 3- or 4-millimeters diameter.

b. Laying equipment. Cable is issued on metal drums containing 1,094 yards of single wire or 547 yards of double wire. The drums can be mounted on a metal pack device (fig. 123) which is attached to the wire layer by leather straps. It has a handle for paying out wire. The drum also may be mounted on a pair of skis for use in snow. Two models of a mechanical layer, truck-mounted, are in use.

c. Carrier equipment CMT–34. Carrier equipment CMT–34 (figs. 124 through 127) is capable of from one- to three-channel narrow-band speech transmission over moderately long distances. It will operate up to approximately 100 miles over 3-mm. bronze wire without an intermediate amplifier, and much farther with an amplifier. The carrier frequency range is such that other apparatus can be operated simultaneously on the same line. Soviet telegraph and facsimile equipment which can be used simultaneously with the CMT–34 is as follows:

Figure 123. Typical man pack reel.

Apparatus	*Carrier frequency*	*Channels*
Carrier (nomenclature unknown).	0–80 c/s	Two 2-way teletype.
Audio telephone	150–2400 c/s	1.
Facsimile	3200–5200 c/s	1.
Carrier (nomenclature unknown).	6200–9000 c/s	Three 2-way teletype.
CMT–34	10,400–40,000 c/s	3.

CHARACTERISTICS

Number of channels	1 to 3.
Frequency range	10.4–38.4 kc/s.
Speech frequency range	200–2400 c/s.
Speech channels	See below.
Transmission level:	
Audio input level (at 800 c/s)	0 nepers.
Audio output level (at 800 c/s)	8 nepers.
Transmitter level:	
Carrier	+2.5 nepers.
Sideband	+1 neper.
Minimum receiver level:	
Carrier	−2.5 nepers.
Sideband	−5 nepers.
Highest line attenuation	5 nepers.
Transmission range: (3-mm. bronze overhead line, normal weight)	
Normal	168 miles.
With heavy frost	84 miles.
Power supply	Batteries or other sources; 24 and 220 volts; ringing current of 16, 25, or 50 c/s.

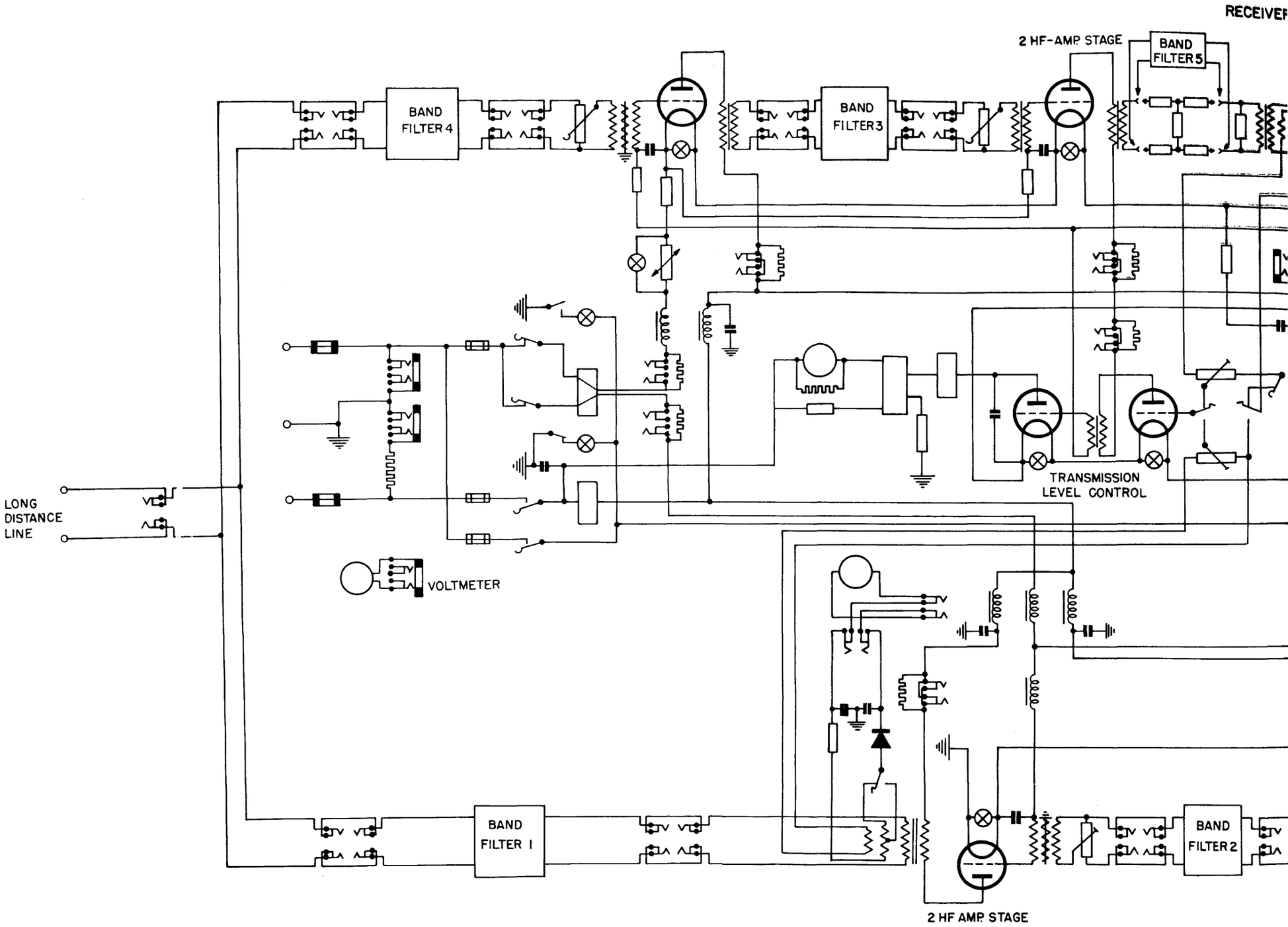

RECEIVER
2 HF-AMP STAGE
BAND FILTER 5
BAND FILTER 4
BAND FILTER 3
LONG DISTANCE LINE
TRANSMISSION LEVEL CONTROL
VOLTMETER
BAND FILTER 1
BAND FILTER 2
2 HF AMP STAGE
TRAN

Figure 12

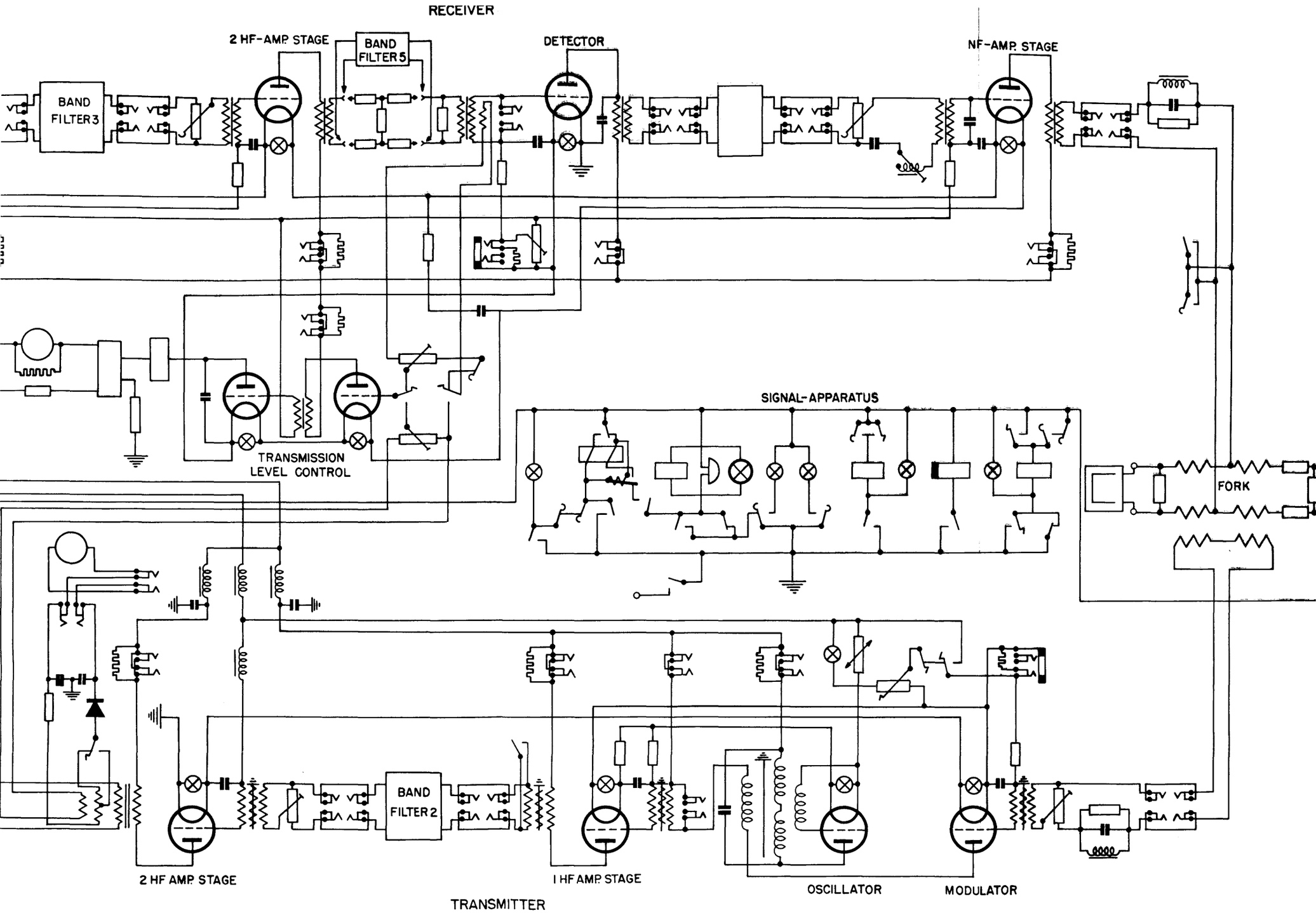
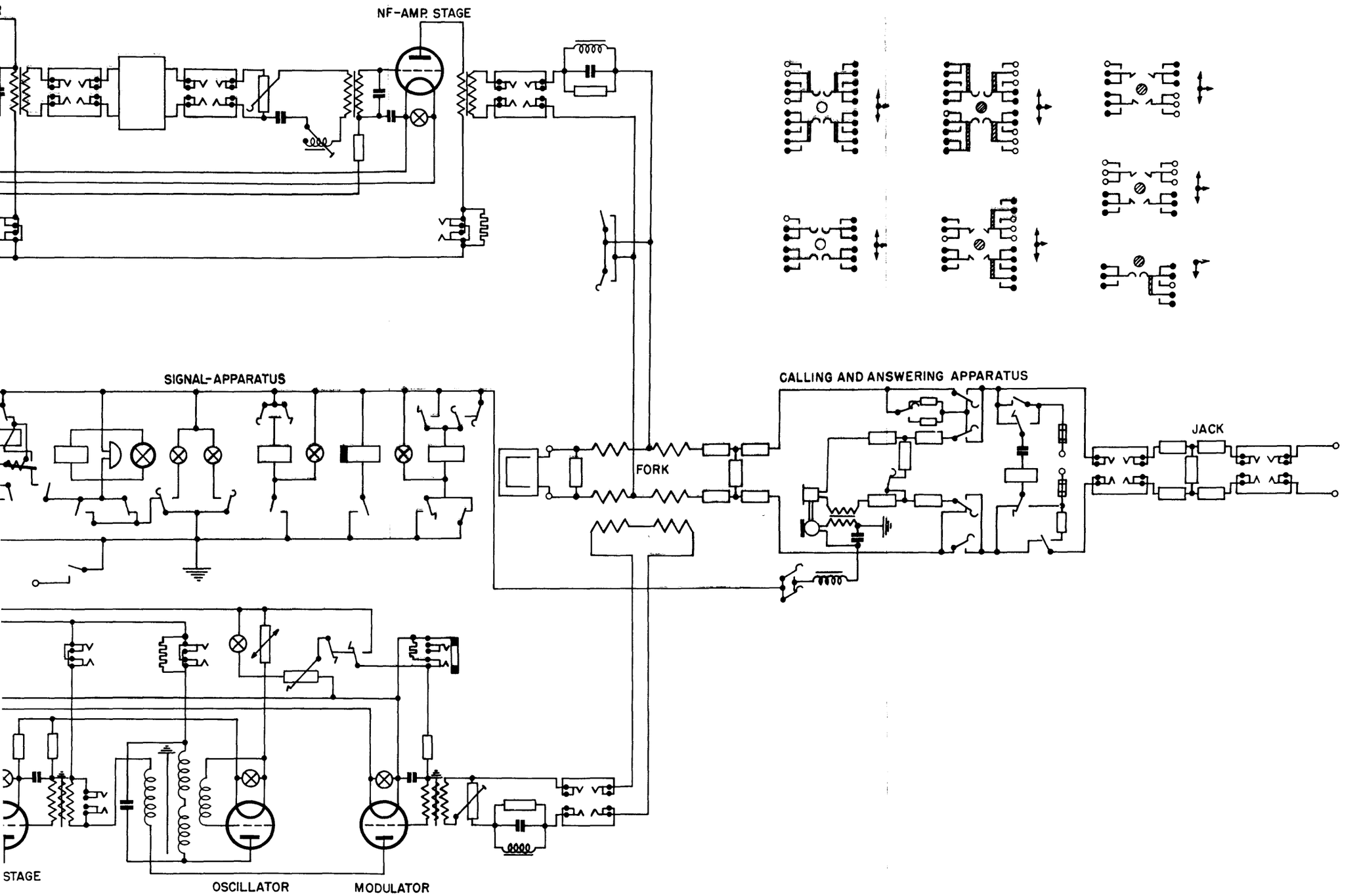


Figure 125. Circuit diagram of CMT-34 terminal station.



4T-34 terminal station.

Power requirements:

Plate:

Terminal set	220 v. at 220 ma.
Intermediate amplifier set	220 v. at 250 ma.

Filament:

Terminal set	24 v. at 2.5 a.
Intermediate amplifier set	24 v. at 2.2 a.

(Grid voltages are obtained from the filament circuit. The signalling current utilizes 24 volts, generally obtained from the filament supply.)

Dimensions:

Terminal set:

Height (without stand)	8.2 feet.
Height (with stand)	8.5 feet.
Width	2.2 feet.
Depth	1.3 feet.
Weight	462 pounds.

Intermediate amplifier set:

Height (without stand)	8.2 feet.
Height (with stand)	8.5 feet.
Width	2.2 feet.
Depth	1.3 feet.
Weight	484 pounds.

Tubes and stages:

Terminal set:

Transmitter:

Oscillator	TO141.
Modulator	TO141.
Buffer	TO142.
Power amplifier	TO143 or YO186.

Receiver:

First R. F	TO141.
Second R. F	TO141.
Detector	TO141.
Audio	TO142.
Transmission level control tubes (2).	TO141.

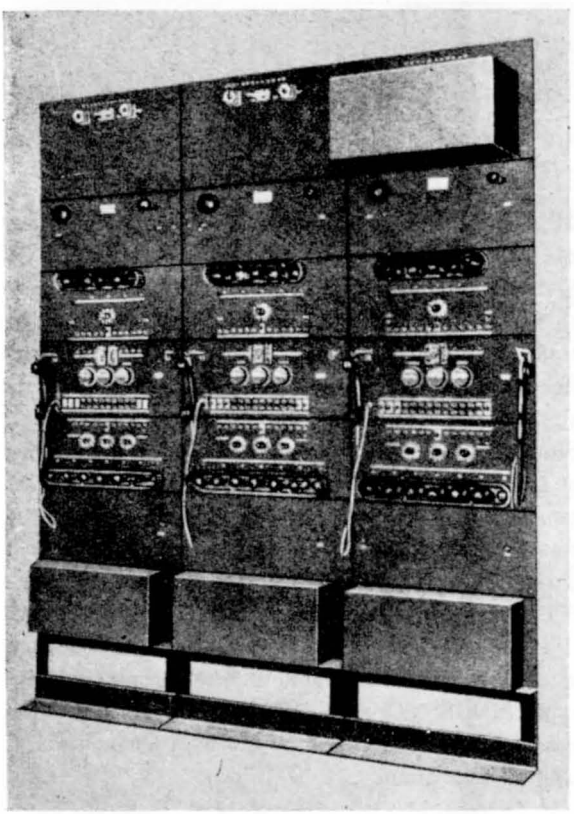
Intermediate amplifier set:

"Over amplifier":

First amplifier	TO141.
Second amplifier	TO141.
Third amplifier	TO143 or YO186.
Transmission level control tubes (2).	TO141.

"Under amplifier":

First amplifier	TO141.
Second amplifier	TO141.
Third amplifier	TO143 or YO186.
Transmission level control tubes (2).	TO141.



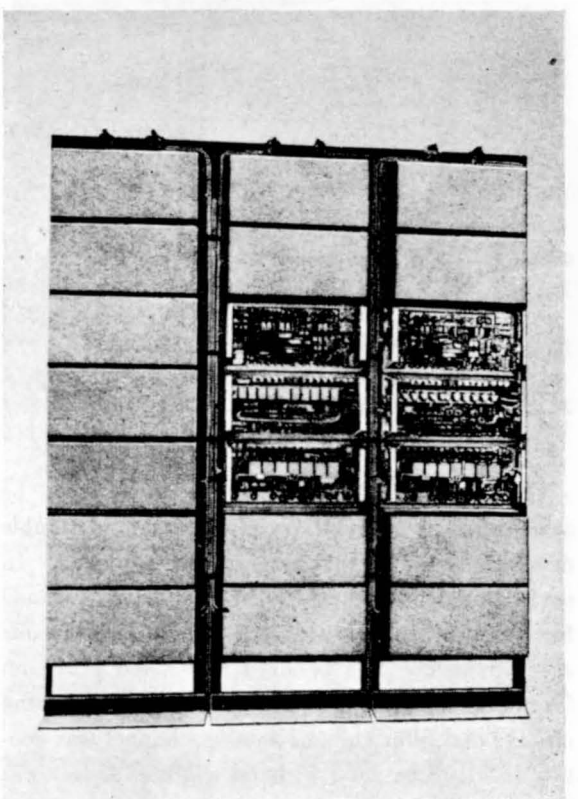


Figure 124. CMT–34 terminal station.

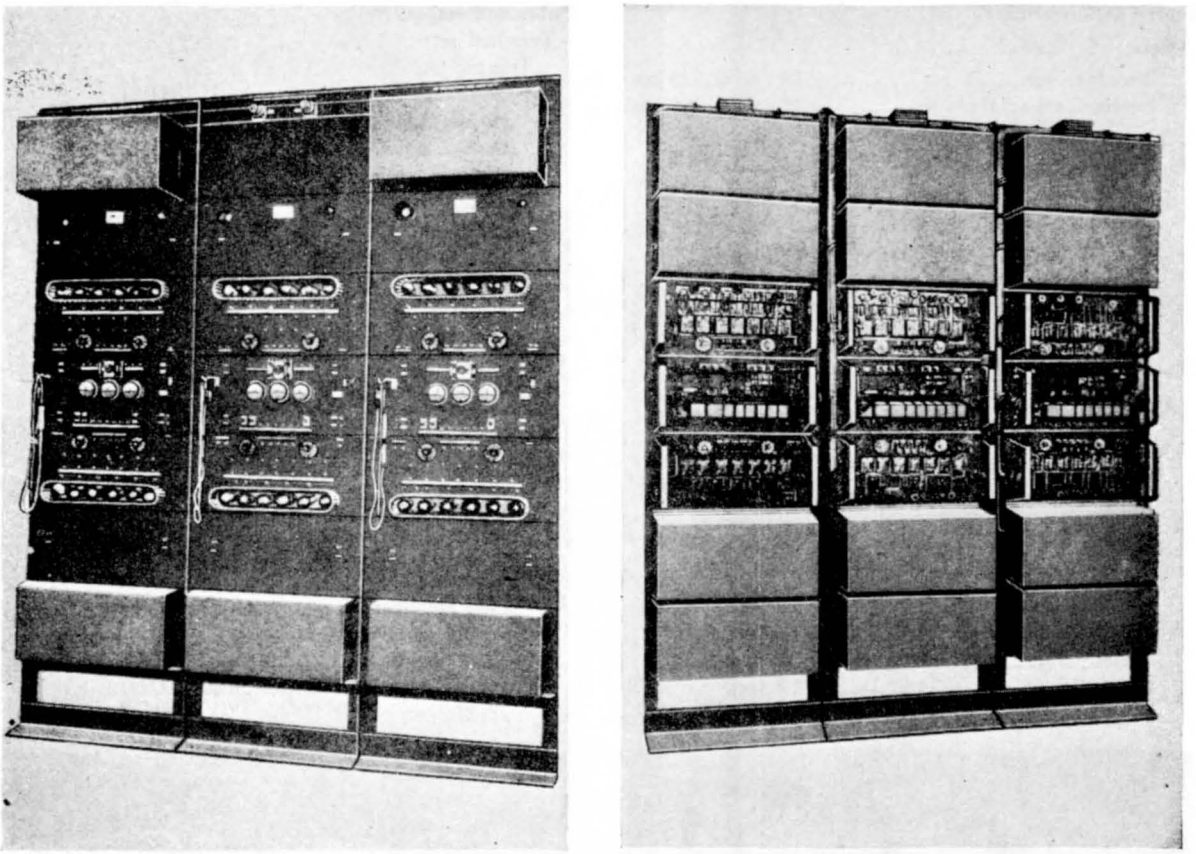


Figure 126. CMT–34 intermediate station.

CMT–34 SPEECH CHANNELS

Channel	*Carrier direction*	*Band width*	*Carrier*
1	A to B	10.4–12.8	12.8
	B to A	25.6–28.0	28.0
2	A to B	15.4–17.8	17.8
	B to A	31.0–33.4	33.4
3	A to B	20.2–23.1	20.7
	B to A	36.0–38.4	38.4

Channel "O," 6.2 to 8.6 kilocycles, can be switched in as an auxiliary channel should trouble develop on any of the three regular channels. In some models of the CMT–34, provision is made for a fourth channel, although no resonant circuits are provided. It is believed that some provision for the superimposing of a fourth channel on the circuits and filter coils of another channel was contemplated. Channel "4" band width is as follows: 4B, 42.0 to 44.4 kilocycles; 4A, 48.6 to 51 kilocycles.

Absolutely stable automatic transmission level regulation is not possible. With the aid of the transmission level control tubes, however, the level fluctuation of the carrier with light and moderate signals does not vary more than ± 0.2 neper. Simplified four-wire remote control of the carrier at the terminal station is possible only through extensive modifications in the station wiring or through the sacrifice of the ringing current channel.

d. Filters. The Soviets use filters to permit telephones and telegraphs to use the same wires.

Filter A. Filter A (fig. 128) is designed to allow the use of a telephone in a telegraph line with types MORSE, UZA, ST–35, etc. It has a wooden case which measures 5.3 by 8.9 by 10.3 inches and weighs 13.2 pounds.

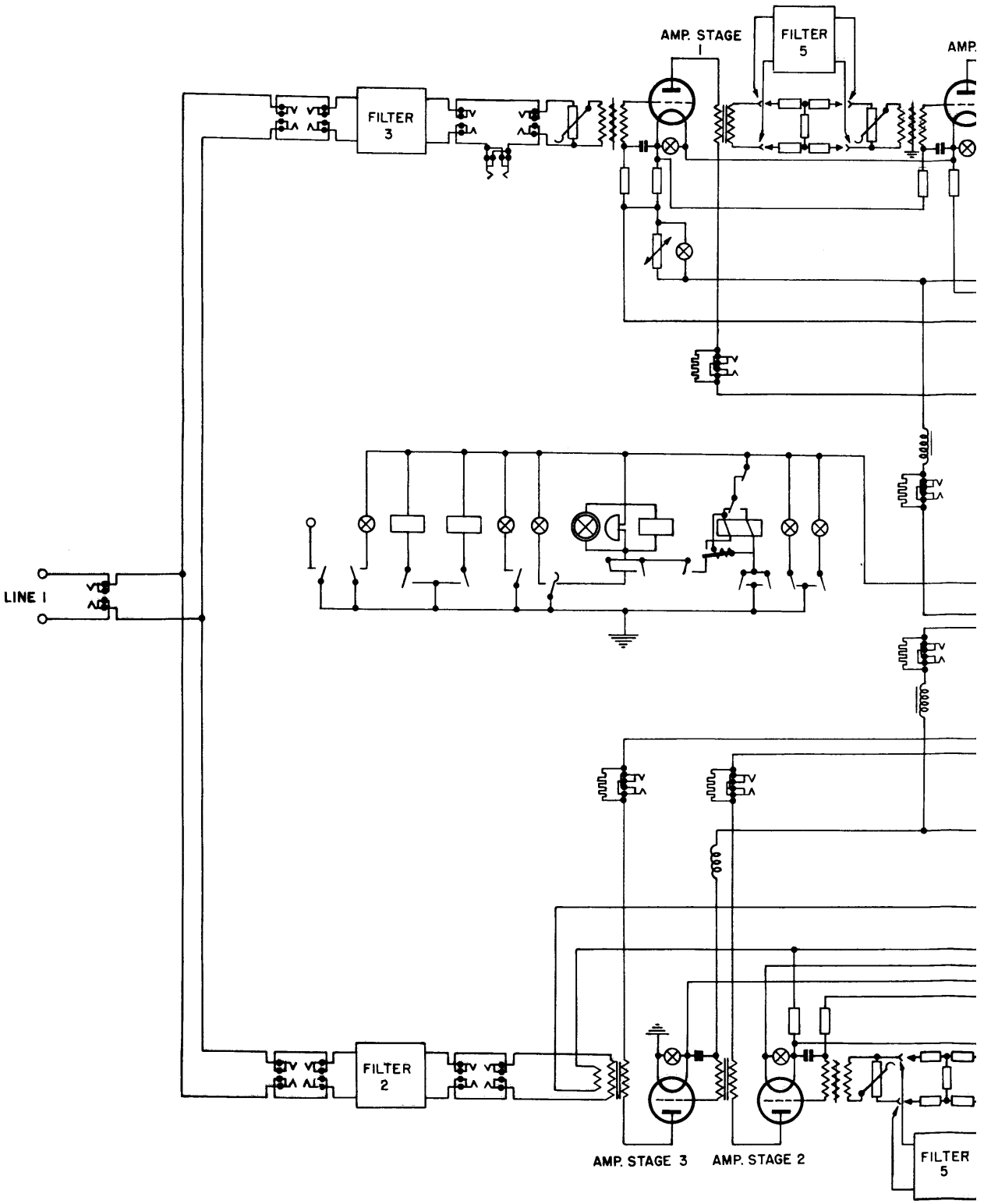
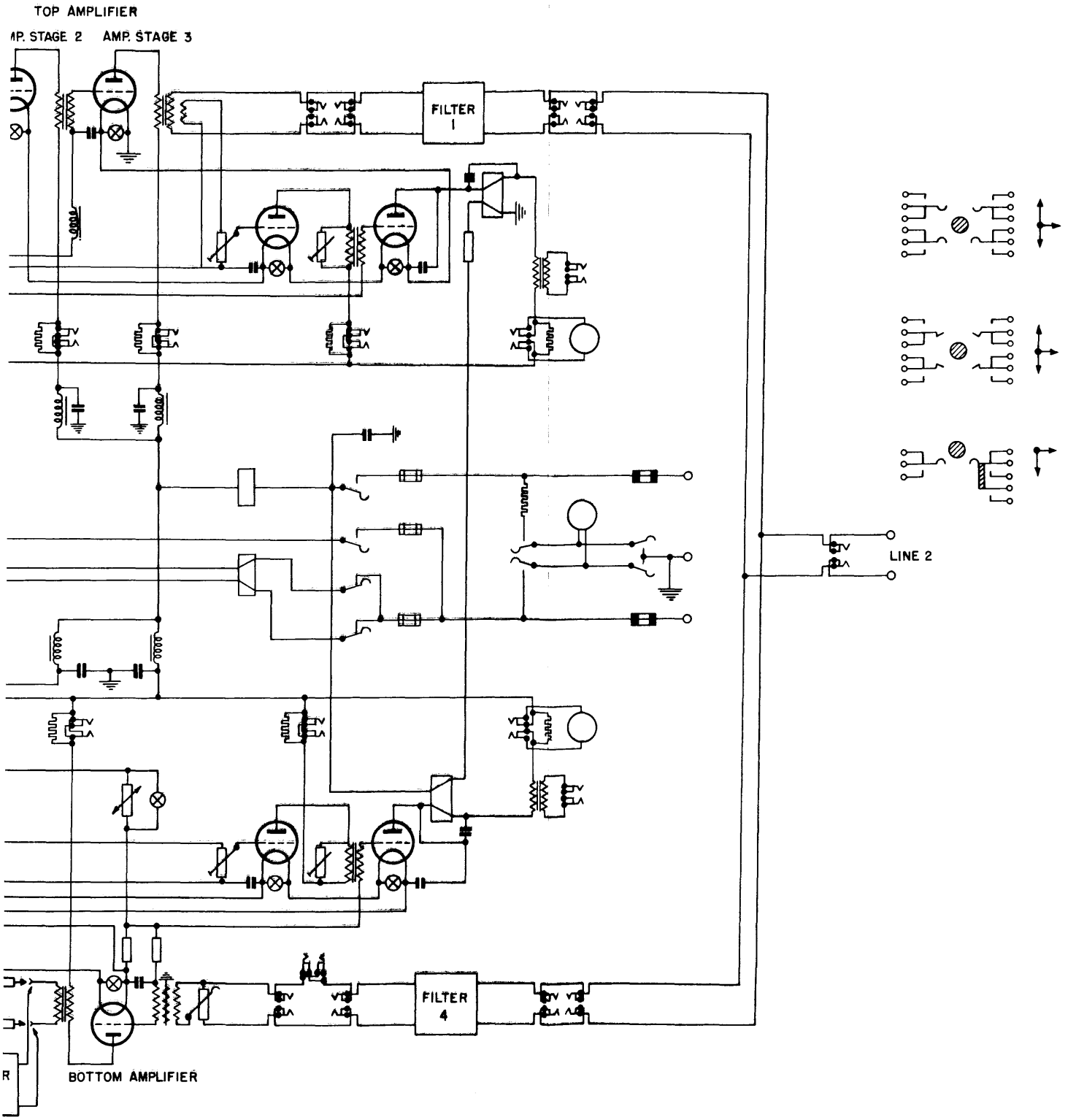


Figure 127. Circuit



uit diagram of CMT-34 intermediate station.

Filter A–2. Filter A–2 (fig. 129) is contained in an iron case which measures 16.9 by 8.6 by 7.4 inches and weighs 36.8 pounds. It is similar to filter A. The Filter A–2 permits simultaneous operation of a telegraph and a telephone on two wires.

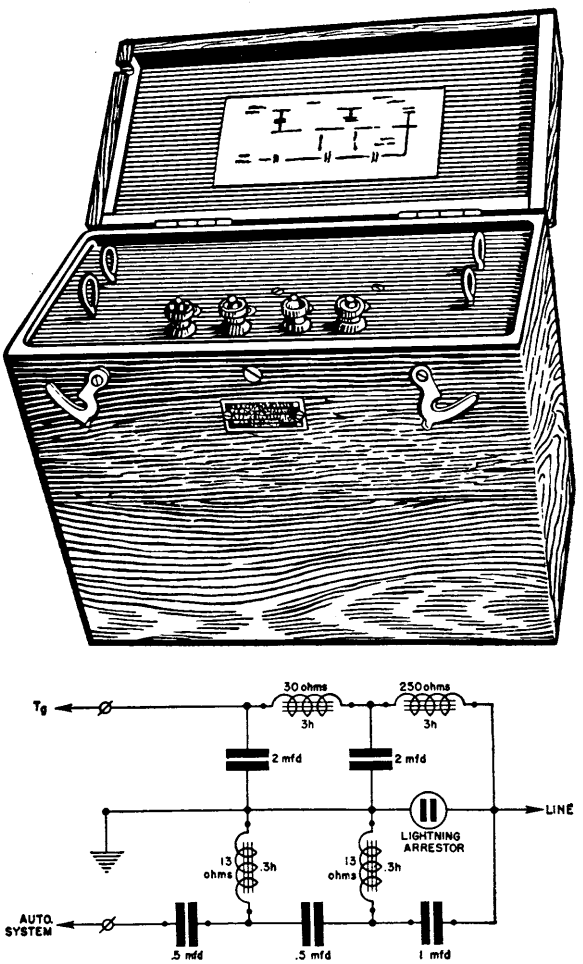


Figure 128. Filter A.

line resistance or short circuits. The variable resistor scale is calibrated in ohms. Two ranges are provided, 0.2 to 50 ohms and 20 to 5,000 ohms. A zero-center galvanometer is used to indicate balance. There are three binding posts to which the line may be connected, one post is common to both ranges. There also are two push-buttons, one for each range, which must be pressed to connect the battery and galvanometer in the circuit. A space in the bottom of the case is provided for the battery. The normal battery voltage is not known, but the unit will operate satisfactorily on a 3-volt dry cell, such as signal corps BA–205/U. The unit must be placed in a horizontal position to operate properly.

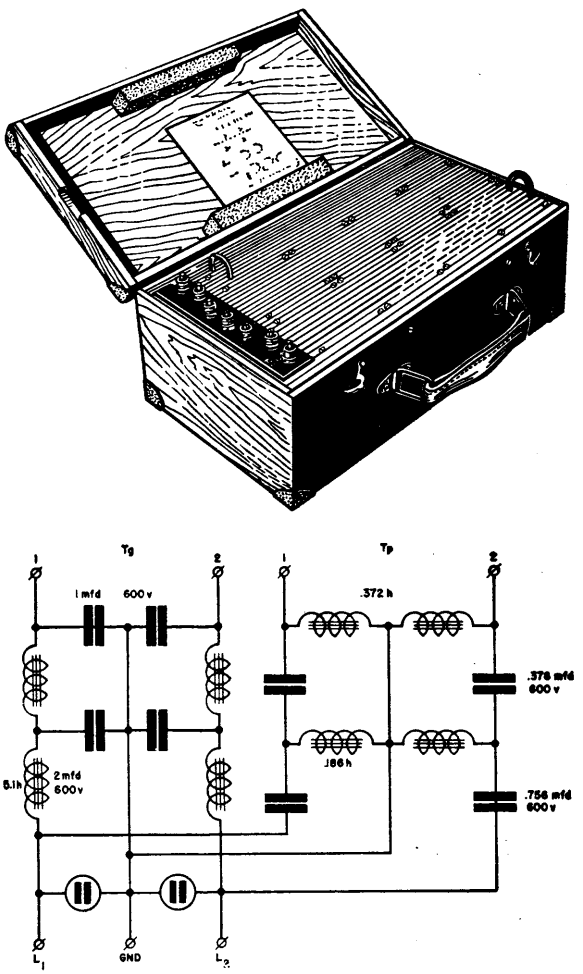


Figure 129. Filter A–2.

e. Test Set RD–1. Test set RD–1 (fig. 130) is used for line and station testing on switchboards R–20 and R–60 and is included as an accessory in those units. It is encased in a wooden box, 13.5 by 10.2 by 5.3 inches. The RD–1 contains battery, transformer, induction coils, bell, ohmmeter, potentiometer, handset, and the necessary switches, binding posts, etc.

f. Line bridge. The Soviets use a simple, battery-operated bridge (fig. 131) for measuring

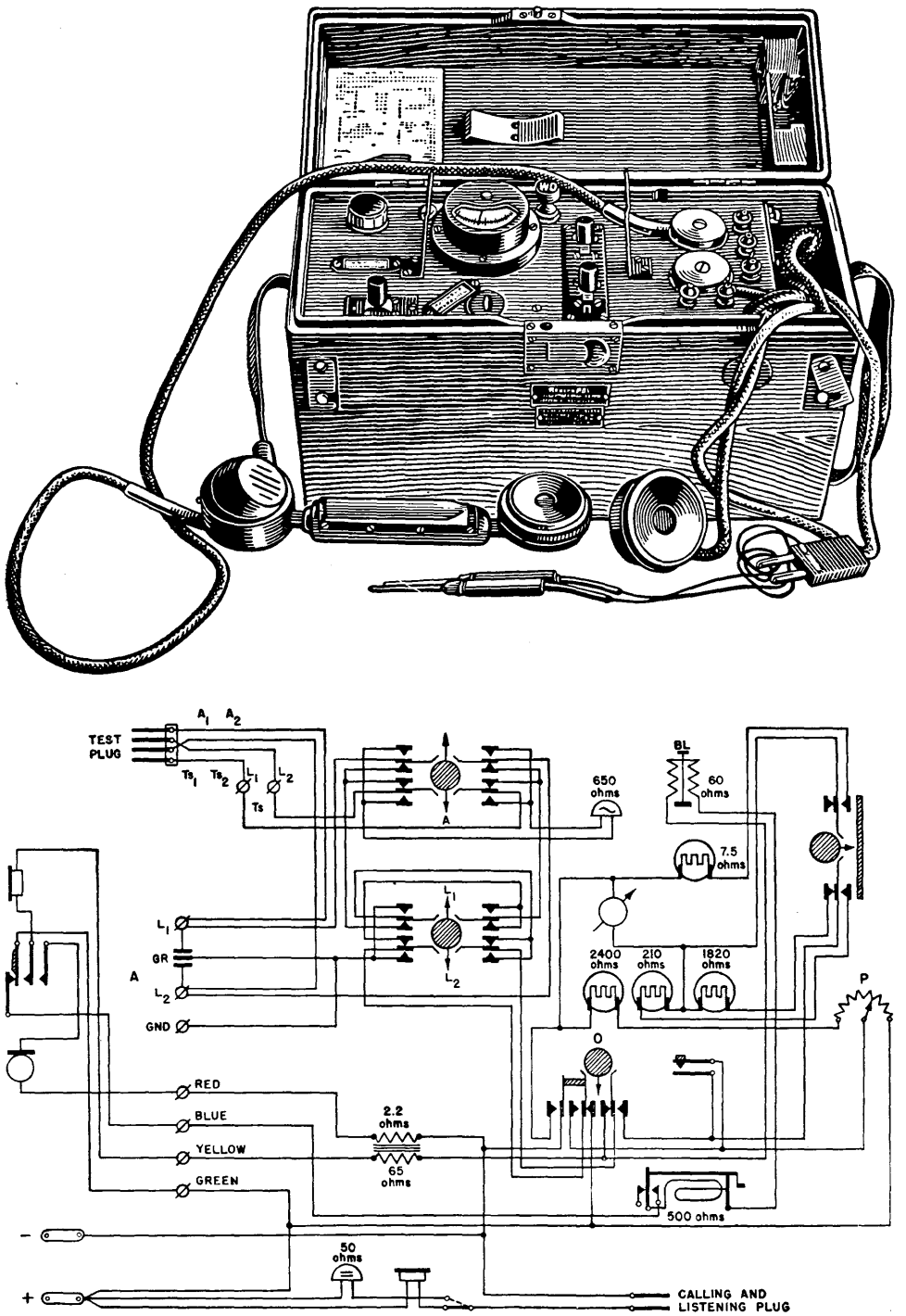


Figure 130. Test set RD–1.

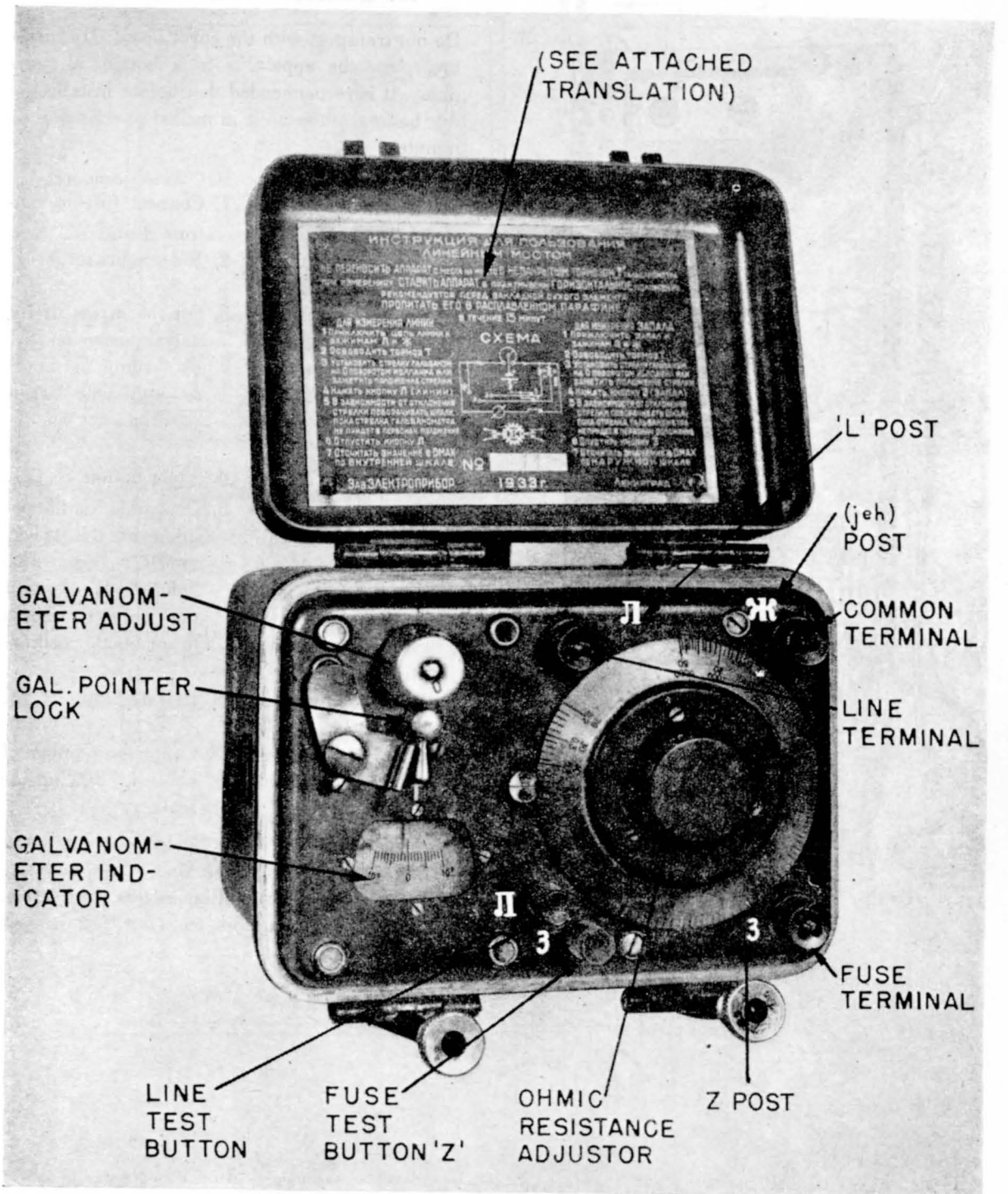


Figure 131. Line bridge.

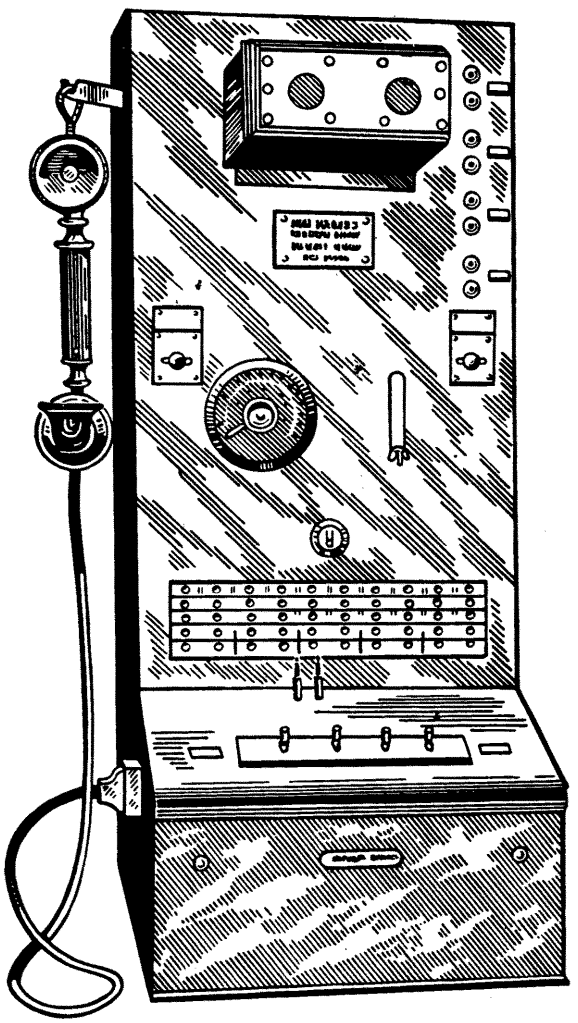


Figure 132. "Red Dawn" line amplifier.

INSTRUCTIONS FOR USE OF LINE BRIDGE

Do not transport with the cover open. To measure, place the apparatus in a horizontal position. It is recommended that before installing a dry battery, immerse it in melted paraffin for 15 minutes.

Line measuring	*Fuse measuring*
1. Connect the line to knobs Л and Ж.	1. Connect fuse to buttons 3 and Ж.
2. Loosen the brake "T."	2. Release brake "T."
3. Set the arrow of the galvanometer on "O" by turning the knob, or else note arrow position.	3. Set the arrow of the galvanometer on "O" by turning the knob, or else note arrow position.
4. Press button Л(L).	4. Press button 3 (Z).
5. Depending on the position of the galvanometer, turn the "ohms" knob until the pointer returns to original position.	5. Depending on the position of the galvanometer, turn the "ohms" knob until the pointer returns to original position.
6. Release button Л (L).	6. Release button 3 (Z).
7. Count the number of ohms in the inside scale.	7. Count the number of ohms in the outside scale.

g. Miscellaneous. The Soviets also use standard line equipment such as line relays and amplifiers, voltmeters, volt-milliammeters, ohmmeters, boosters, lightning arrestors, etc. (figs. 132 through 140).

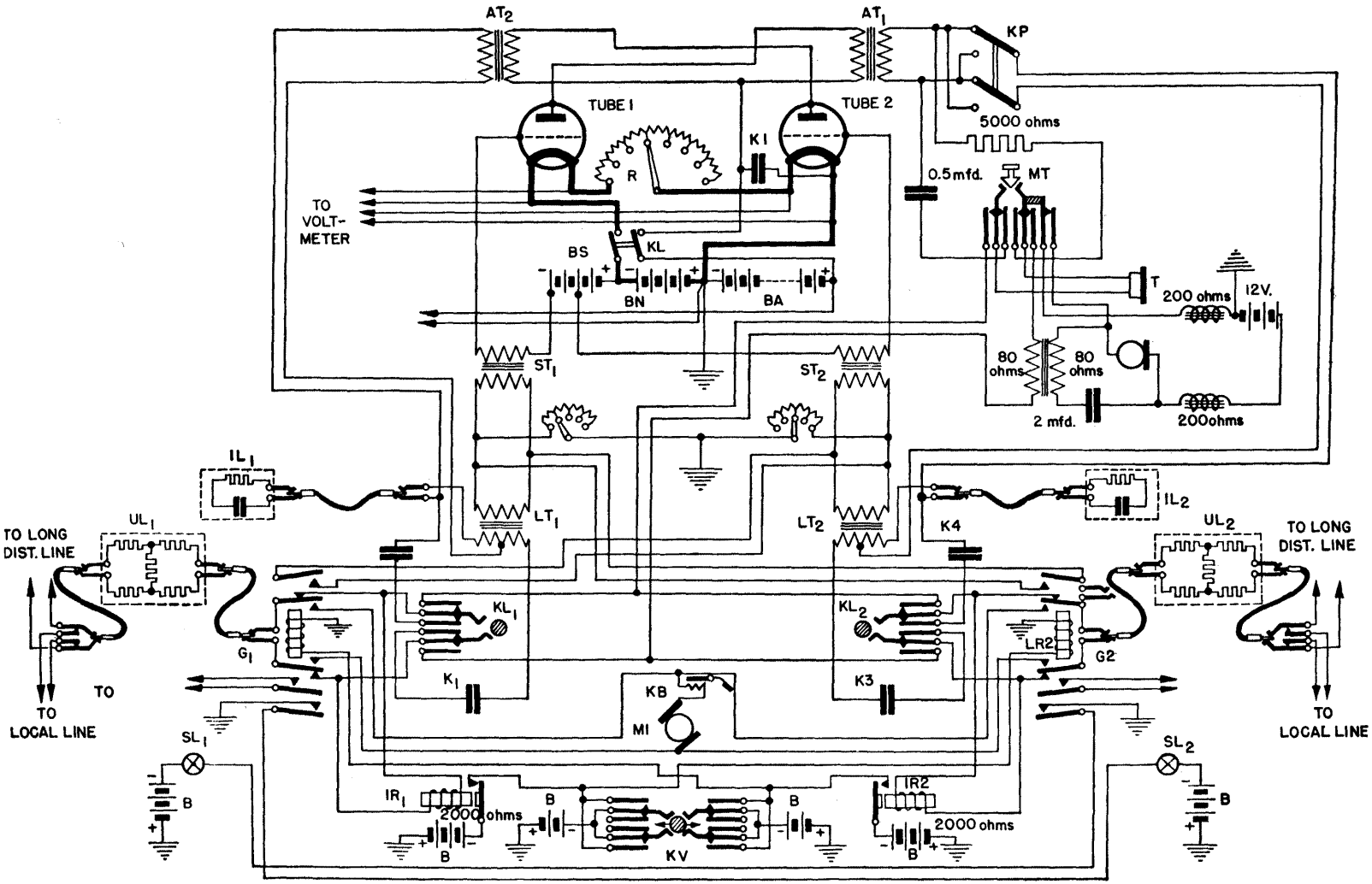


Figure 133. Circuit diagram of "Red Dawn" line amplifier.

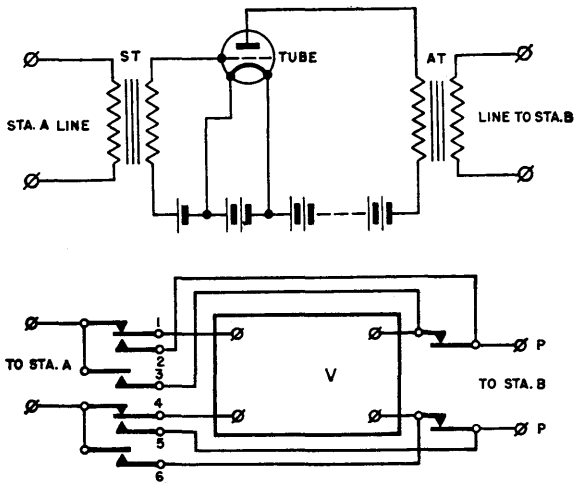


Figure 134. Uni-directional (reversible) line relay (top) and reversing switch for line relay (bottom).

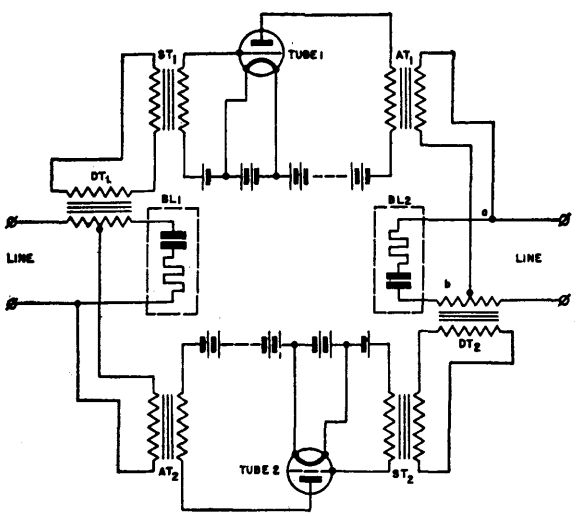


Figure 135. Duplex line relay.

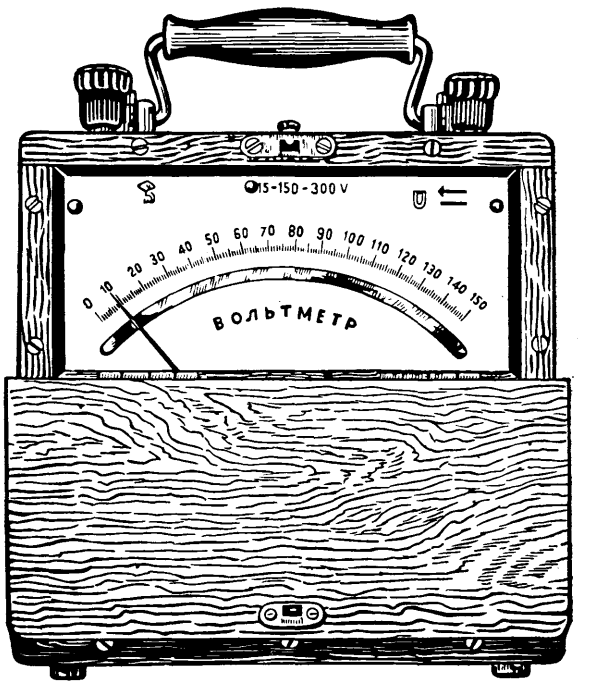


Figure 136. Voltmeter.

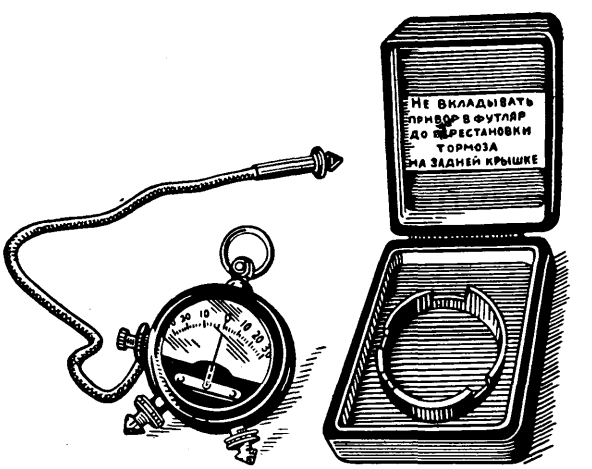


Figure 137. Volt-milliammeter.

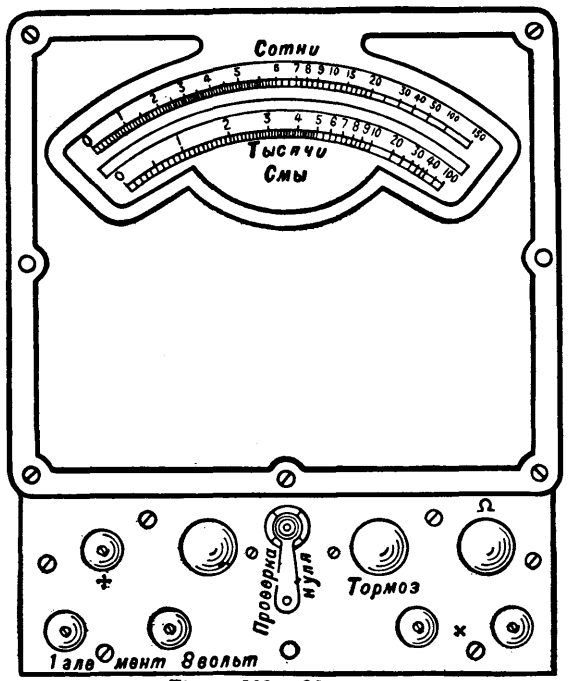


Figure 138. Ohmmeter.

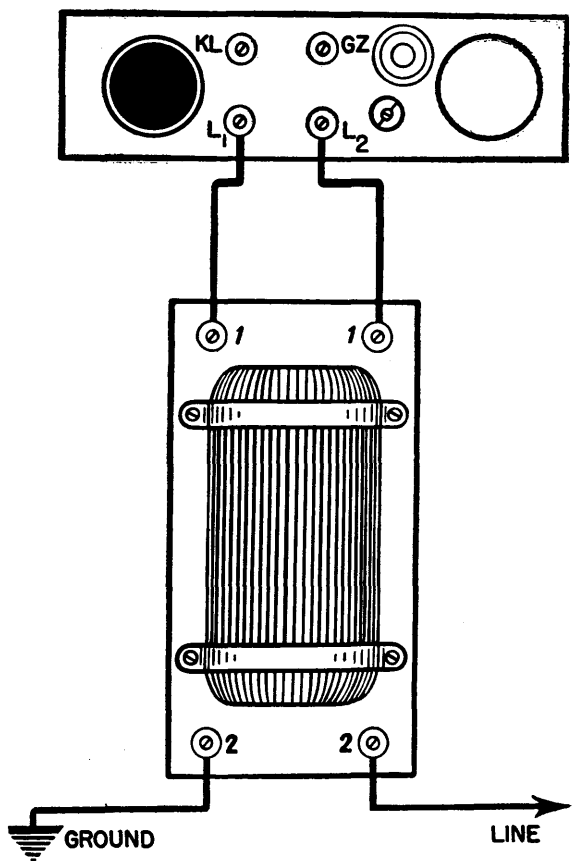


Figure 139. "Signal strength booster" transformer for widely separated stations.

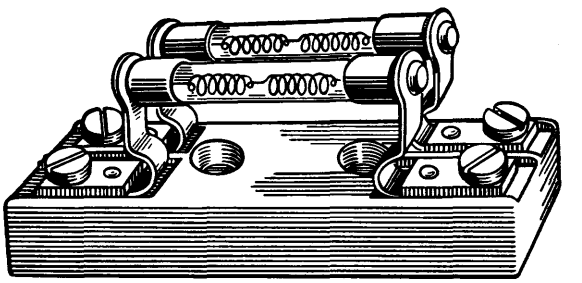


Figure 140. Typical lightning arrestor.

Section IV. POWER SUPPLY

1. BATTERIES

a. Dry cells. The single-cell Soviet battery (fig. 141) has a positive electrode of carbon and a negative electrode of zinc. A sal ammoniac electrolyte is used, and manganese peroxide depolarizer, contained in a case of porous material, surrounds the carbon electrode. The electrolyte is mixed with sawdust, gypsum, or flour. Batteries normally are charged for 6 hours, refilled with water, and dried. They then produce approximately 1.45 to 1.5 volts. The normal internal resistance of the cell is from 0.25 to 0.50 ohm.

It is believed that the Soviets fully utilize an ordinary dry cell by using it in various types of equipment as its voltage declines. A new cell, which produces from 1.2 to 1.5 volts under load, is used in voice frequency signalling telephones. Those producing only 1 to 1.2 volts are used in magneto type telephones, and those producing

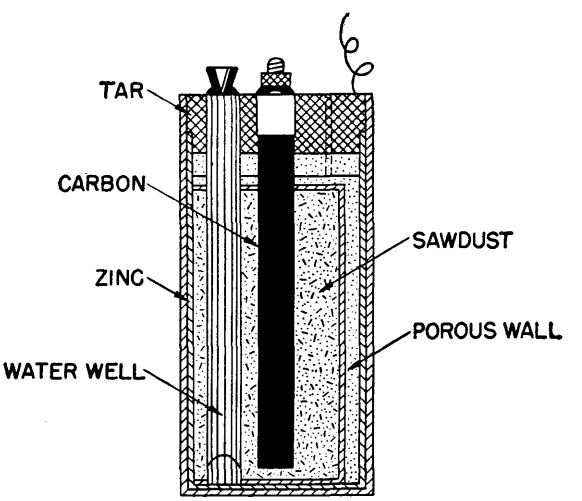


Figure 141. Soviet dry cell design.

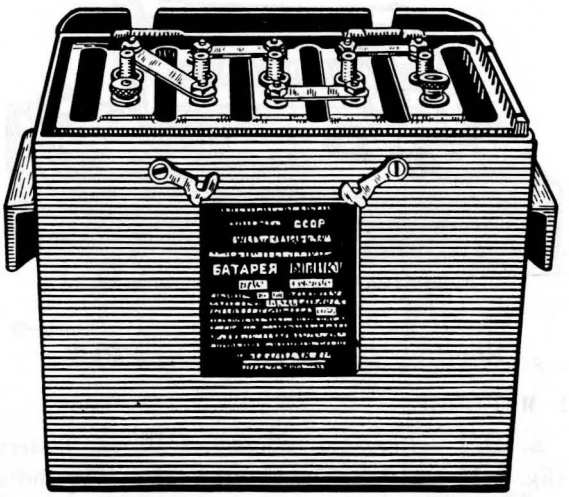


Figure 142. Storage battery 5–NKN–45.

from 0.7 to 1 volt are used in common battery telephone systems. A cell is discarded when it develops less than 0.7 volt. The field telephone normally uses two cells, each producing at least 1 volt, in series.

b. Storage batteries. The Red Army normally uses two types of storage batteries, lead-acid and nickel-cadmium, for telephone and telegraph work. The lead-acid cells, indicated by the letter "A," normally are used in permanent installations and for rear echelon work. The nickel-cadmium types are used in the field.

The first figure in the nomenclature of a nickel cadmium battery denotes the number of cells. "NKN" indicates nickel-cadmium, the type of battery. The last figure indicates the capacity of the battery in ampere hours. Thus, the 5–NKN–45 (fig. 142) is a 5-cell, approximately 1.2 volts each, nickel-cadmium battery of approximately 45-ampere hour capacity.

Batteries are charged at a rate roughly equal to one-fourth of their capacity. Thus the charging rate for the 5–NKN–45 would be approximately 11 amperes. The Soviets also state that a charging rate of 20 amperes may be used, providing the temperature does not exceed 40° C. Batteries will charge to 1.8 volts per cell. Recharging is indicated when they drop to below 1.1 volts per cell. The batteries normally are charged after every 50 hours of operation.

Characteristics. Technical characteristics of Soviet batteries and battery chargers are as follows:

Z–D	Dry cell (?).
Z–V	
Z–S	Dry cell (?).
4–S	Dry cell (?).
BAS–60 No. 3	60-volt, dry cells.
BAS–60 No. 12	60-volt, dry cells, greater capacity than No. 3.
BAS–80	80-volt, dry cells.
2–NKN–10	2-volt, alkaline wet, 10 ampere hour.
2–NKN–22	2-volt, alkaline wet, 22 ampere hour.
4–NKN–2.25	4-volt, alkaline wet, 2.25 ampere hour.
4–NKN–2.5	4-volt, alkaline wet, 2.5 ampere hour.
4–NKN–10	4 volt, alkaline wet, 10 ampere hour.
5–NKN–22	5-volt, alkaline wet, 22 ampere hour.
5–NKN–45	5-volt, alkaline wet, 45 ampere hour.
5–NKN–60	5-volt, alkaline wet, 60 ampere hour.
5–NKN–100	5-volt, alkaline wet, 100 ampere hour.
64–NKN–2.25	64-volt, alkaline wet, 2.25 ampere hour.
1.5–ZS–3	Battery charger.

2. DYNAMOTORS-GENERATORS

RU–75. The RU–75 (figs. 143 and 144) is a compact, light weight, ventilated dynamotor. It is believed to be used as a transmitter plate supply for

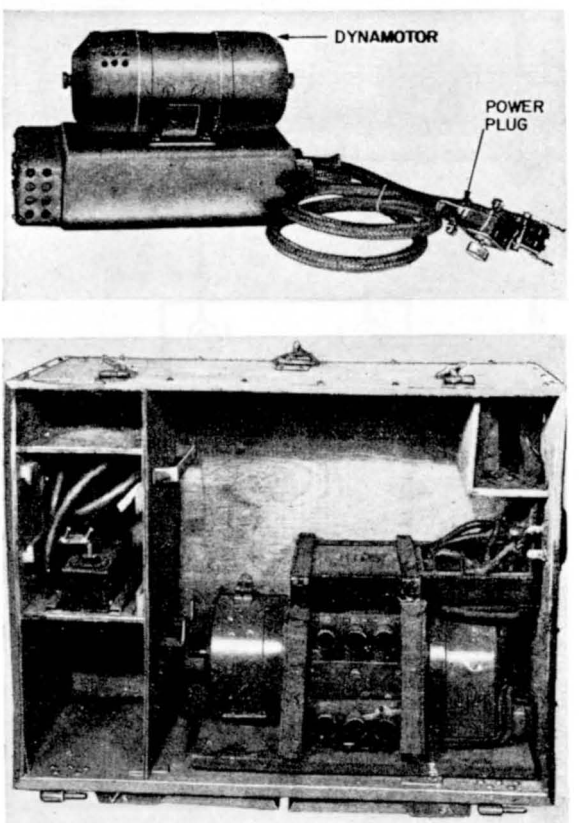


Figure 143. Dynamotors RU–75 (top) and RUN–75 (bottom).

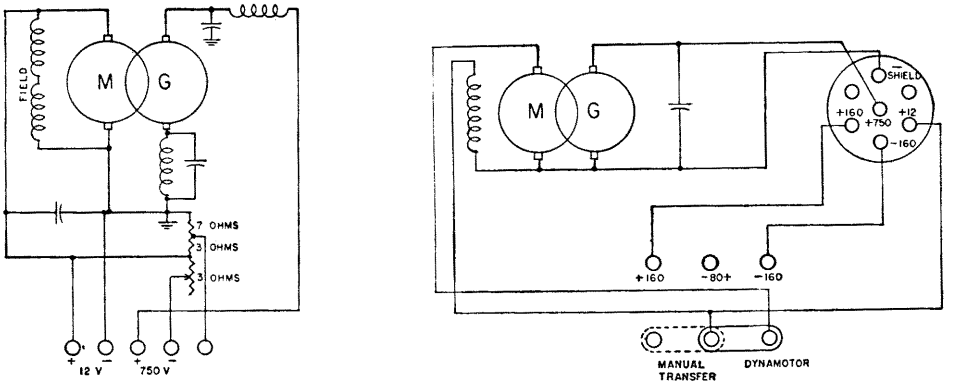


Figure 144. Circuit diagrams of dynamotors RU–75 (left) and RUN–75 (right).

vehicular or aircraft radio. The high voltage output is filtered by a R. F. choke and capacitor in each lead. The carbon holders are conventional. The frame, covers, and chassis are made of aluminum. All wiring is covered with varnished fabric. A brown plastic is used for most of the insulation and for choke forms and capacitor cases. Ball bearings are used. The dynamotor is cylindrical and is 3½ inches in diameter and 9 inches long. The assembly, less cables, measures 6½ by 10 by 4½ inches. Total weight is 11 pounds.

RUN–75 (RM–2). The RUN–75 (figs. 143 and 144) dynamotor is mounted in a canvas-covered wooden case. It apparently is used as a radio transmitter plate supply. The dynamotor assembly is mounted on small rubber pads. A seven-pole female socket, positioned on the outside of the case, is provided for connection to radio equipment. There also is a six-pole terminal strip in the side of the dynamotor. Its purpose is not known.

The dynamotor has ball bearings. Carbon brushes are used, and brush tension may be adjusted easily. The commutator is deeply undercut. Field current may be controlled externally. The cylindrical dynamotor is 4 inches in diameter and 12 inches long. The case measures 19 by 15 by 10 inches.

Characteristics. Technical characteristics of Soviet dynamotors-generators are as follows:

Nomenclature	*Input*	*Output*	*Revolutions per minute*
RUN–75 (RM–2)	12v/12a	750v/100ma	4,500
RU–75	12v/12a	750v/100ma	
RUN–10			
RUN–10–A			
RUN–30			
RUN–225			
RUN–300			
RUN–K–450			
RU–11			
SDN–1,000			
SDN–3,000			
RDN–1,000			
RDN–2,500			
ARN–SS			
BRA–SS			
DRP–3			
GS–1,000			
ZR–SS			

Section V. OTHER AGENCIES OF COMMUNICATION

1. VISUAL

Several different types of signal lamps are manufactured by the Soviets. It is believed that these are employed to a great extent throughout the Red Army. Heliographs also are used. The type of lamps in common usage are as follows:

Type	*Day range*	*Night range*
SP–600 mm	600 yards	1,500 yards.
SP–95 mm	1 mile	4 miles.
Zeiss SP–100 mm		
Zeiss SP–250 mm	7 miles	30 miles.

Signal flags, pyrotechnics, and panels are of conventional design and are employed in the normal manner.

2. PIGEONS

Pigeons are used in the more temperate regions of the Soviet Union, but not in Arctic regions. They are unable to withstand prolonged exposure to low

temperatures. The lofts are of conventional design. Forward elements have wicker baskets, containing from two to three pigeons each, which can be packed easily on the back.

3. MESSENGERS

Dispatch riders and mounted messengers utilize whatever type of transportation is available in their particular component of the Red Army or in their geographical area. Thus, railroads, motorcycles, trucks, light airplanes, horses, dog teams, and, in some instances, camels are used. Dogs were utilized as messengers, but were found to be unreliable under mortar fire, although they could operate through heavy artillery fire.

4. MESSAGE CENTERS

Red Army message centers receive, log, and dispatch field documents and reports. They generally are located in concealed positions near the operations sections of their respective headquarters, but in positions easily accessible to messengers. The chief of the signal element also is the chief of the message center. He maintains the message center log and is responsible for timely delivery.

Four general classes of documents and orders of priority are as follows:

"AIR"---------- Messages from aircraft warning stations.

Group "G"-------- Field orders and orders for the execution thereof.

Group "K"-------- Documents which may be opened by the addressee only.

Group "B"-------- Documents which may be opened either by the operations chief or by the addressee.

When documents are delivered to the message center for transmission, a receipt is signed and the time of delivery noted. Documents must be presented in correctly addressed envelopes, with the group classification, if applicable, and a receipt form.

Periodic reports and group "B" documents are sorted by "time priorities" and are delivered prior to the time specified in the "Schedules of Headquarters Document Forwarding", prepared daily by the signal officer, approved by the Chief of Staff, and distributed to all offices. Documents without priority are forwarded after all others. Documents may be forwarded out of turn only on order from the Chief of Staff. Field orders must be placed in envelopes containing no other documents.

Group "G" and "K" documents received in a message center are delivered to the Operations Officer on duty, who enters them in a log and delivers them unopened. Group "G" documents go to the operations chief, and group "K" documents to the addressee. Group "B" documents received in a message center are delivered either to the operations chief or to the addressee.

It is believed that selection of the means of transmission rests with the message center. Incoming and outgoing lists are maintained in the centers with notations of method of transmission and time received.

Liaison officers receive documents and sign receipts at the issuing office without use of the message center.

The unit commander and his Chief of Staff are responsible for coding facilities. The Chief of Staff is responsible for radio and wire security discipline.

Section VI. SUPPLEMENTARY DATA

1. TECHNICAL GLOSSARY

A-Battery—Батарея Накала
A. C.—Переменный Ток
A. F. C.—Автоматическая Регулировка Частоты
Ammeter—Амперметер
Amplifier—Усилитель
Anode—Анод
Antenna—Антенна
Audio—Звуковая
A. V. C.—Автоматическая Регулировка Усиления
B-Battery—Анодная Батарея
Battery—Батарея, Элемент
Cable—Кабель
Capacitor—Конденсатор
Cathode—Катод
Centimeter—Сантиметр
Condenser—Конденсатор
Coil—Катушка
Connected—Включение
Connection—Соединение
Control—Управлять

Control Grid—Управляющая Сетка
Corrector (Compensator)—Корректирующий Контур
Counterpoise—Противовес
Coupling—Связь
Crystal—Кварц
Current—Ток
Detector—Детектор
Diode—Диод
Disconnected—Выключать
Dry Battery—Сухая Батарея
Dynamotor—Умформер
Filament—Нить Накала
Filter—Фильтр
Fine—Точная
Frequency—Частота
Frequency Control—Стабилизация Частоты
Frequency Converter—Преобразователь Частоты
Grid—Сетка
Ground—Земля
Headphones—Головной Телефон
Heat Regulator—Накал Реостат
High—Высокая
High Frequency—Высокая Частота
Intermediate Frequency—Промежуточная Частота
Jack—Джек
Key—Ключ
Local Oscillator—Местный Гетеродин
Long Waves—Длинные Волны
Loose—Слабая
Loudness—Громкость
Loudspeaker—Громкоговоритель
Low—Низкая
Low Frequency—Низкая Частота
Master Oscillator—Задающий Генератор
Medium Waves—Средние Волны
Meter—Метр
Microphone—Микрофон
Milliammeter—Миллиамперметр
Mixer—Преобразователь
Modulation—Модуляция
Off—Выключено
On—Включено
Oscillator—Генератор Колебаний
Output—Отдаваемая Мощность
Plate—Анод
Plug—Штепсель
Portable Ground Station—Переносная Наземная Радио Станция
Power—Мощность
Quartz—Кварц
Radio—Радио
Radio Station—Радио Станция, Рация
Receive—Принимать
Receiver—Приемник
Regeneration—Обратная Связь
Relay—Реле
Remote Control—Дистанционное Управление
Resistor—Сопротивление
Rheostat—Реостат
Rigid—Жесткий
Rod Antenna—Прут Антенна
Screen Grid—Экранирующая Сетка
Short Wave—Короткие Волны
Storage Cell—Аккумуляторный Элемент
Suppressor Grid—Защитная Сетка
Switch—Переключатель
Telegraphy—Телеграфия
Telephone—Телефон
Telephony—Телефония
Terminal—Конечный
Test—Испытание
To—К
Tone Filter—Тон Фильтер
Tone Modulation—Тон Модуляция
Transformer—Трансформатор
Transmitter—Передатчик
Trimmer (Condensor)—Подстроечный Конденсатор
Tube—Лампа
Tuning—Настройка
Variable—Переменная
Voltage—Напряжение
Voltmeter—Вольтметр
Volume—Громкость
Wave Length—Длина Волны
Wet Cell—Элемент
With—С
Without—Без

2. RADIO TUBES

For radio tube data, see figure 145. The meanings of designations in the "Type" column are unknown.

Type tube	Type	Filament		Plate voltage	Screen grid voltage	Grid bias	Plate current	Characteristic curve slope (ma/v.)	Plate R in (kilohms)	Plate dissipation (watts)	Speech output (milliwatts)
		Ef	If								
2A2	C7	d2	0.06	120	100	0	0.5	0.18			
2D1	C7	d2	.15	120	70	0	5	.4	220		
2F1	3	d2	.125	120		−1	3.4	1.6	15.6		180
2F2	3	d2	.06	120		−1	2	.9	28		
2G2	2 x 2+3	d2	.06	120		0	.5	.35	140		
2J1	P4	d2	.32	160	80	−2.5	7	1.75	300		500
	V5	d2	.125	120	70	−1	3.5	1.4	1,100		
2K2	V5	d2	.06	120	70	−0.5	3	.9	1,500		
				100	100	−2	2.5	.9	800		
2K3											
2N1	P3+P3	d2	.24	120		0	2.2	1.8	16		1,000
2P1	P5	d2	.18	120	120	−2	4.1	1.8	180		130
2P2	P5	d2	.32	120	70	−3	5.5	1.9	150		180
				160	120	−6	10	2	50		450
6D1	3+6	6.3	.3	100		0	3	2.4	600		
				250	100	−3	2.7	.35			
6E5	M	6.3	.3								
6FU6	Sek. Em. Pent	6.3	.67	250	100	−1.5	10	10	.25		
6G7	2 x 2+3	6.3	.3	250		−3	1.1	1.2	58		
6J2	V5	6.3	.45	300	150	−2	10	9	710	3	
6J3	V5	6.3	.45	300	200	−3	12.5	5	700	3.8	
6J6	5	6.3	.3	250	100	−3	2	1.2	1,500		
6P3	P5	6.3	1	300	250	−14	72	6	25	25	6,500
6P4	P5	6.3	.3	250	250	−20	32				
6P6	PB	6.3	.9	375	250	−17.5	57	6	22.5	24	11,500
6Z5	RII	6.3	.6	2 x 350			75				
	2 x 2	6.3	.3	2 x 100			4				
12B1	2 x 2+P5	12.5	.22	25	25	−1	1.1	1.9	7.5		
12B2	2 x 2+5	12.5	15	25	25	−1	1.3	.8	150		
12D1	4+6	12.5	.15	25	25	0	3				
				25	25	−1	2.5	.13			
12J1	5	12.5	.225	25	25	−1.5	2	1.4	200		
12K1	V5	12.5	.225	25	25	−1.5	2	1.4	200		
12M1	P5+P5	12.5	.225	25	25	−1	1.1	1.9	7.5		
15A6	P5	15	.3	250	250	−16.5	34	2.5	80	8.5	3,200
25P1	P5	25	.3	180	135	−20	38	2.5	40		
30Z6	RII	30	.3								
ET1	3	d3.6	.065	120		−4	.8	.4	25	0.3	
G1	B3	d5.2	1.3	750				1	60	12	6,700
MT1	P3	d3.3	.55	240		−25	9.7	.6	8.5		250
UT1	P3	d3.6	.6	240		−26	9	.7	5.7		250
LT2	3	d3.6	.08	80		−1.8	7	.38	26		
PT2	3	d3.6	.065	120		−4	.8	.4	28	0.3	4
UO3	P3	d3.6	.27	160		−6.5	7.5	1.5	6.7		80
J4	P3	d4.1	.9	400				.5	33	20	7,000
G5	P3	d11	3.5	1,200				1.4	5.5	30	38,500
R5	3	d3.8	.7	80		−2.5	.8	.3	28	2	6
ST6	R4	d3.6	.08	20	−2	8	1.5	.6	5.5		
UP6	P3	d5.6	.82	400		−15	20	1.5	6.7	8	800
P7	3	d3.8	.7	80		−1	1.1	.33	30	2	6
R7	3	d3.8	.7	80		−3	.6	.3	28	2	7
G9	B3	d5.2	1.3	750				1	60	12	6,700
G10	P3	d4.1	.9	400				.5	33	20	7,000
UT15	P3	d4.8	.8	240		−14	7.5	1.3	7.7		250
ST19	3	d2.3	.25	160		−2	1.5	.3	84		4
P19	3	d2.3	.25	160		−2	1.5	.3	84		4
PT19	3	d2.3	.25	160		−2	1.5	.3	84		4
PO20	3	d1	.2	120		−5	5	.6	13		
PT20	3	d3.6	.08	120		−4	1.5	.4	25	.3	2.5
GK20	P3	d5.6	.85	750				1.75	28	25	
PO23	3	d1.2	.22	120		−5	5	.6	13		15
UK30	P3	d5.6	.85	400		−20	20	1.5	6.7	8	800
UK33	P3	d11	2.5	800		−60	110	4	2	120	11,000
UK34	P3	d5.6	.85	500		−35	50	1.5	4.7	20	700
GK36	P3	d5.6	.86	750				1.7	29	20	4,800
M39	P3	d11	3.5	1,200				1.45	6.9	30	38,500
UT40	P3	d3.6	.18	160		−8	4.4	1	10		50
SO44	P4	d3.6	.22	160	65	−2	9	1.3	153	3	800
G65	B3	d5.2	1.3	750				1	60	12	6,700
PO74	3	1.5	1.8	160		−7	8	1.3	7.7		15
TO76	P3	d1	1.1	240				.8	12.5		
NT79	3	3.6	.7	160		−5	8	2	5		100
UK80	P3	d5.6	.82	400		−15	20	1.5	6.7	8	800
ST80	4	d3.6	.18	200	90	−2	3	.5	400		
SO81	4	1	1.3	160	60	−1	4	1	170		
ST83	3	d3.6	.075	200		−3	2	.3	90		4
SO90	P5	d1.7	1	200	100	−3	11	1	200		
UT92	P3	d3.6	.18	160				.7	11.2	2	
SO95	4	1.8	2	200	80	−2	4.5	1.2	166		
UO104	P3	d4	.75	240		−35	40	3	1.35	12	1,500
UO107	3	d4	.075	120		0	8.5	1.35	8.3	2	
UB107	P3	d4	.075	160		−6	5.2	1.2	9	2	50
PB108	3	d1.2	.085	80		−6	1.8	.45	19	.2	10
PB110	3	d4	.08	160		−1	3	1.2	20	2	40
UB110	3	d4	.08	160		−1	3	1.2	20	2	40
UB111	P3	d4	.08	160		−7	8	1.2	4.2		
SB112	4	d4	.08	160	80	−1	2.4	.6	500	1	
PO114	3	1.5	2	160		−1		1	35		
UB115	P3	d4		160		−10		1.5	6.7		
SO118	3	4	1	240		−3	6	1.75	19	4	70
PO119	P3	4	1	240		−10	12	1.7	7	5	100
SO122	P5	4	1	240	140	−11	22	2	70	5	1,000

Figure 145. Characteristics of Soviet radio tubes.

Type tube	Type	Filament Ef	Filament If	Plate voltage	Screen grid voltage	Grid bias	Plate current	Characteristic curve slope (ma/v.)	Plate R in (kilohms)	Plate dissipation (watts)	Speech output (milliwatts)
SO124	4	4	1	160	60	−1	7.5	1.8	300	4	250
UB132	P3	d4	.15	160	.....	−8	12	2	4.25	5	250
TO141	3	d2.5	1	220	.....	−4	8	2.2	10	4	50
TO142	3	d2.5	1	220	.....	−10	17	2.3	.....	6	150
SO142	3	.....	.....	.....	.....	.....	.....	.....	5	.....	.....
SB142	3	.....	.....	.....	.....	.....	.....	.....	5	.....	.....
TO143	3	d4	1	220	.....	−35	50	3.5	1.15	12	1,500
SB143	3	d4	1	220	.....	−35	33	2.7	1.5	10	.....
SO144	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SB146	P5	d4	.16	160	120	−5	7	2	100	.....	500
SB147	4	d4	.15	160	80	−1	5.5	1.6	250	3	.....
UB147	V4	d4	.15	160	80	0	7.5	1.85	215	2	.....
SO148	V4	4	1	240	80	−2	7.5	1.6	200	4	.....
SB151	V4	d4	.8	240	80	−1	3.5	1.1	635	2	.....
SB152	3	d2	.12	80	.....	0	6	1.5	9.5	2.5	40
UB152	3	d2	.11	120	.....	−4	6	2	4.6	2	40
UB153	3	d2	.2	100	.....	−6	.....	2.5	4	2.5	200
UK153	3	d2	.2	100	.....	−6	.....	2.5	4	2.5	200
SB154	V4	d2	.11	160	60	−1	3.5	1.25	290	2	.....
SB155	P5	d2	.25	120	120	−4	10	2.5	48	4	300
UB155	P5	d2	.225	100	60	0	9	2.1	106	4	200
SB156	2 x 2+3	d2	.15	80	.....	−2	3	1.4	10	2	.....
SO156	3+3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
SO157	V4	4	1	240	100	−1	.....	3	500	.....	.....
SK158	P4	d5.6	.85	750	150	.....	.....	1.75	230	20	4,800
SB165	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
UO178	3	d2	.12	120	.....	0	1.3	1.2	26	2.5	60
UB178	3	d2	.12	100	.....	−.5	2	1.1	30	2.5	60
UB179	P3	d4	2	300	.....	−25	100	6	1.35	30	5,000
UB180	P3	d4	2	750	.....	−80	7	7	9.5	50	30,000
UB180	P3	d4	2	750	.....	−60	75	8	1	50	12,000
SO182	V5	4	1	240	100	−1.5	7	2.5	800	4	.....
UB182	3	d4	.15	240	.....	−6	12	2.4	3.7	3	.....
SO183	C7	4	1	240	100	−2	4	2.2	115	4	.....
SO184	2 x 2+3	4	1.1	240	.....	−7	.....	1.7	8.2	5	.....
SO185	2 x 2+3	4	1.1	240	.....	−4	5	1.5	22	5	.....
SO186	P3	4	1	400	.....	−85	37.5	3.2	1.4	15	4,000
UO186	P3	d4	1	250	.....	−37.5	57	3.2	1.25	15	1,500
SO187	P5	4	2	240	240	−8	37	7.5	90	10	2,500
SB190	5	d2	.1	160	120	−1	1	1.2	420	1	.....
SB191	C7	d2	.1	120	60	0	2	.8	550	.....	.....
SO193	2 x 2+5	4	1	240	120	−6	7	2	150	5	800
SB194	3+3	d2	.3	120	.....	−6	.....	2.5	12	2.5	1,000
SO194	3+3	d2	.32	120	.....	−2	10	2.2	7.5	3	1,000
SO200	4	d5.5	2	500	150	.....	.....	.....	.....	20	.....
UO201	P3	4	.8	240	.....	.....	.....	3	6.7	15	1,500
SB219	.....	d2	.31	.....	.....	.....	.....	.....	.....	.....	.....
SB240	3	d2	.125	120	.....	.....	.....	.....	.....	.....	.....
UB240	3	d2	.125	120	.....	−1	3.4	1.6	15.6	.....	180
UO240	3	d2	.125	120	.....	−1.5	3.0	1.5	16.7	.....	.....
SB241	V5	d2	.125	120	70	−.5	4.4	1.2	1,000	0.8	.....
SO241	V5	d2	.125	120	70	−1	3.5	1.4	1,100	.....	.....
SB242	C7	d2	.15	120	70	0	5	.4	220	.....	.....
SO243	P3+P3	d2	.24	120	.....	0	2.2	1.8	16	.....	1,000
SB243	P3+P3	d2	.24	120	.....	0	2.2	1.8	16	.....	1,000
SB244	P5	d2	.18	120	120	−2	4.1	1.8	180	.....	130
SB245	2+P3	d2	.32	160	.....	−7.5	10	2.2	2	.....	.....
SB245	2+P3	d2	.32	120	.....	−4	26	2.2	4	.....	.....
SB245	P4	d2	.32	160	80	−2.5	7	1.75	300	.....	500
SO257	5	d2	.25	100	100	−3	6	2.5	1,500	.....	.....
SB258	P5	d2	.32	120	70	−3	5.5	1.9	150	.....	180
				160	120	−6	10	2	50	.....	450
S300	3	d11.2	.03	60	.....	0	2	.37	30	.....	.....
MDS	R4	d3.6	.08	20	−2	8	1.5	.6	5.5	.....	.....
Mikro	3	d3.6	.08	120	.....	−4	1.5	.4	28	0.3	2.5
DCM 1	Triode	.....	.....	.....	.....	.....	.....	.....	.....	9–10	.....

Figure 145. Characteristics of Soviet radio tubes—Continued

3. FREQUENCY CONVERSION TABLE

The following conversions of frequencies into fixed wave numbers are used by the Red Army.

Frequency in kilocycles	*Wave No.*	*Frequency in kilocycles*	*Wave No.*	*Frequency in kilocycles*	*Wave No.*	*Frequency in kilocycles*	*Wave No.*
1500	60	1675	67	1850	74	2100	84
1525	61	1700	68	1875	75	2125	85
1550	62	1725	69	1900	76	2150	86
1575	63	1750	70	1925	77	2175	87
1600	64	1775	71	1950	78	2200	88
1625	65	1800	72	1975	79	2225	89
1650	66	1825	73	2000	80	2250	90
				2025	81	2275	91
				2050	82	2300	92
				2075	83	2325	93

Frequency in kilocycles	Wave No.	Frequency in kilocycles	Wave No.	Frequency in kilocycles	Wave No.	Frequency in kilocycles	Wave No.
2350	94	3525	141	4700	188	5875	235
2375	95	3550	142	4725	189	5900	236
2400	96	3575	143	4750	190	5925	237
2425	97	3600	144	4775	191	5950	238
2450	98	3625	145	4800	192	5975	239
2475	99	3650	146	4825	193	6000	240
2500	100	3675	147	4850	194	6025	241
2525	101	3700	148	4875	195	6050	242
2550	102	3725	149	4900	196	6075	243
2575	103	3750	150	4925	197	6100	244
2600	104	3775	151	4950	198	6125	245
2625	105	3800	152	4975	199	6150	246
2650	106	3825	153	5000	200	6175	247
2675	107	3850	154	5025	201	6200	248
2700	108	3875	155	5050	202	6225	249
2725	109	3900	156	5075	203	6250	250
2750	110	3925	157	5100	204	6275	251
2775	111	3950	158	5125	205	6300	252
2800	112	3975	159	5150	206	6325	253
2825	113	4000	160	5175	207	6350	254
2850	114	4025	161	5200	208	6375	255
2875	115	4050	162	5225	209	6400	256
2900	116	4075	163	5250	210	6425	257
2925	117	4100	164	5275	211	6450	258
2950	118	4125	165	5300	212	6475	259
2975	119	4150	166	5325	213	6500	260
3000	120	4175	167	5350	214	6525	261
3025	121	4200	168	5375	215	6550	262
3050	122	4225	169	5400	216	6575	263
3075	123	4250	170	5425	217	6600	264
3100	124	4275	171	5450	218	6625	265
3125	125	4300	172	5475	219	6650	266
3150	126	4325	173	5500	220	6675	267
3175	127	4350	174	5525	221	6700	268
3200	128	4375	175	5550	222	6725	269
3225	129	4400	176	5575	223	6750	270
3250	130	4425	177	5600	224	6775	271
3275	131	4450	178	5625	225	6800	272
3300	132	4475	179	5650	226	6825	273
3325	133	4500	180	5675	227	6850	274
3350	134	4525	181	5700	228	6875	275
3375	135	4550	182	5725	229	6900	276
3400	136	4575	183	5750	230	6925	277
3425	137	4600	184	5775	231	6950	278
3450	138	4625	185	5800	232	6975	279
3475	139	4650	186	5825	233	7000	280
3500	140	4675	187	5850	234		

4. DISTANCE OF SATISFACTORY TELEPHONY

The distance of satisfactory telephony via standard Soviet transmitters, switchboards, and lines under normal meteorological and magnetic conditions may be computed from the following tables.

Excluding the effects of meteorological and magnetic disturbances, net loss of power (intensity of sound) and net interference in the line are the factors limiting the distances of satisfactory telephony. These factors may be calculated for telephony without repeater stations over standard Soviet transmitters, switchboards, wires and cables. for which the specifications are given below, by the following formulas:

1. Maximal loss of power (net transmitted power must be at least 1 microvolt):

$$L=\frac{N-(a+\epsilon n\,[0.03\sqrt{R\times L_n}])}{\beta 800}\ km.$$

Where,

L = possible distance of telephony in km.,
N = maximal net loss that can be overcome by the telephonic apparatus used.
a = loss of power in nepers at the central telephone station, equal to 0.5 nepers with one switchboard per line,
ϵ = the standard symbol of summation,
n = number of intermediate stations,
R = impedance in ohms. at 800 cycles of 1 km. of wire,
L_n = distances in km. between
$\beta 800$ = loss of power in nepers per km. at 800 cycles.

2. Maximal interference (not to exceed 1 neper in the audible range of 30 to 6,000 cycles):

$$L=\frac{1-\epsilon D_a}{D}\ km.$$

Where,

L = possible distance of telephony in km.,
ϵ = the standard symbol of summation,
D_a = interference of switchboards, and toll lines in nepers,
D = interference of connecting lines per km.

Line elements	*Interference loss (in nepers)*
Switchboards R-60, R-20, and dialing apparatuses	0.03
1 kilometer field cable line RTF-7	.018
1 kilometer field cable line RTF-7 x 2	.034
1 kilometer field cable line RTF-8, single-wire	.014
1 kilometer field cable line RTF-8, two-wire	.023
1 kilometer field cable line RTG-19, single-wire	.011
1 kilometer field cable line RTG-19, two-wire	.013
1 kilometer iron 3-millimeter single-wire line	.008
1 kilometer iron 3-millimeter two-wire line	.009
1 kilometer iron 4-millimeter single-wire line	.0068
1 kilometer iron 4-millimeter two-wire line	.0075
1 kilometer copper 2.1-millimeter pole line	.0035
1 kilometer copper 3-millimeter two-wire line	.0003
1 kilometer copper 4-millimeter two-wire line	.00027

Figure 146. Interferences of standard Soviet switchboards and lines.

5. WIRE DATA

For supplementary wire data, see figures 147 to 150.

Type of wire or cable	Impedance in ohms at 800 cycles		Loss in nepers per kilometer at 800 cycles				
				2-wire bare wire line			
	Single-wire line	2-wire line	Single-wire line	20 centimeters [1]	40 centimeters [1]	60 centimeters [1]	Cable line
Bare iron (steel):							
3 millimeters	29.5	59.0	0.0175	0.020	0.020	0.019	.....
4 millimeters	21.0	42.0	.0138	.0131	.0175	.0163	.....
Bare copper (pole lines):							
2.1 millimeters	5.05	.....	.0051	.....	.....	.....	.....
3 millimeters	.....	5.04	.....	.0044	.0040	.0035	.....
4 millimeters	.....	2.86	.....	.0026	.0024	.0023	.....
Telephone cable:							
LPTK	.....	900 to 1,000	.....	.....	.....	.....	0.8
LPTKM	.....	70 to 90	.....	.....	.....	.....	.6
OPTV	.....	900 to 1,000	.....	.....	.....	.....	.5
OPTVM	.....	70 to 90	.....	.....	.....	.....	.2
RTF-7 x 2	.....	100	.....	.....	.....	.....	.2
RTF-7	100	.....	.1	.....	.....	.....	.....
RTF-8	80	.....	.1	.....	.....	.....	.....
Telegraph cable:							
TRG-19	45	.....	.07	.....	.....	.....	.....
RTG-6	45	.....	.08	.....	.....	.....	.....

[1] Interval between wires (pin spacing). For intervals other than those given, interpolate in arithmetical proportion.

Figure 147. Impedances and net losses of standard Soviet wires and cables.

Temperature (° C.)	Steel wire			Copper wire			Bimetallic wire (4-millimeter, with copper coat)		
	Diameter			Diameter			Copper coat		
	3-millimeter	4-millimeter	5-millimeter	3-millimeter	3.5-millimeter	4-millimeter	0.2-millimeter	0.3-millimeter	0.4-millimeter
+30	20.4	11.5	7.4	2.62	1.92	1.48	5.1	4.0	3.3
+20	19.6	11.1	7.0	2.52	1.85	1.42	4.9	3.8	3.2
+10	18.7	10.5	6.7	2.42	1.78	1.37	4.7	3.7	3.1
0	17.9	10.1	6.4	2.32	1.70	1.31	4.5	3.5	2.95
−10	17.0	9.6	6.1	2.23	1.65	1.26	4.3	3.4	2.8
−20	16.1	9.1	5.8	2.13	1.56	1.20	4.1	3.2	2.7
−30	15.4	8.7	5.5	2.03	1.49	1.14	3.9	3.1	2.6

Figure 148. Normal resistances per kilometer to constant currents.

Temperature (° C.)	Steel wire			Copper wire			Bimetallic wire (4-millimeter with copper coat)		
	3 millimeters	4 millimeters	5 millimeters	3 millimeters	3.5 millimeters	4 millimeters	0.2 millimeter	0.3 millimeter	0.4 millimeter
+30	22.4	12.6	8.1	2.88	2.11	1.63	5.6	4.7	3.7
+20	21.5	12.2	7.7	2.77	2.03	1.56	5.4	4.2	3.5
+10	20.6	11.6	7.4	2.66	1.96	1.51	5.2	4.05	3.4
0	19.7	11.0	7.1	2.55	1.87	1.44	4.95	3.9	3.25
−10	18.8	10.5	6.7	2.45	1.81	1.39	4.75	3.73	3.1
−20	17.7	10.0	6.4	2.34	1.72	1.32	4.5	3.55	3.0
−30	16.9	9.5	6.1	2.23	1.64	1.25	4.3	3.35	2.85

Figure 149. Maximal resistances per kilometer to constant currents.

Number of insulators per kilometer	Insulation of wire from the ground (megohms/kilometer)		Insulation between 2 wires (megohms/kilometer)	
	In dry weather	In rain and fog	In dry weather	In rain and fog
12	40 to 210	2.0 to 2.5	80 to 420	4.0 to 5.
16	30 to 160	1.5 to 2	60 to 320	3.0 to 4.
20	25 to 125	1.2 to 1.5	50 to 250	2.4 to 3.
24	20 to 105	0.9 to 1.2	40 to 210	1.8 to 2.4
30	17 to 85	0.8 to 1	34 to 170	1.6 to 2.

Asymmetry: the difference in resistance to a constant current for telephone and telegraph wires should not be greater than 2 ohms at a repeater station for a 2-wire copper line, or more than 5 ohms for a two-wire steel line.

The electrostatic charge of a 1-wire line in relation to the ground should be within 0.006 to 0.008 microfarads per kilometer; and between 2 wires, 0.004 to 0.007 microfarads per kilometer.

Figure 150. Minimal resistances of insulation between wires and ground and between two wires in megohms per kilometer.

PART IV. ENGINEER EQUIPMENT

Section I. MINES AND BOOBY TRAPS

1. GENERAL

During World War II, the Red Army made extensive use of a large variety of mines. Its employment of mines was skillful and effective. Extensive use also was made of German mines and minefields. The employment of mines in antitank warfare was conventional, mines being used to channelize enemy armor into the fields of fire of antitank guns.

The majority of recovered Soviet mines were made of wood, plastics, tar paper, and asbestos to reduce the effectiveness of electrical mine detectors. Although the Red Army has a large variety of mines (fig. 151), many are only slight modifications of standard designs. Most are simple, well-designed, and of good combat effectiveness. The Red Army increasingly secured mines against removal during the later stages of World War II. (For minefield patterns, hasty employment, and use of controlled charges, see ch. VI.)

Methods of neutralizing Soviet mines are presented purely as information. They should not be construed as official or accepted methods.

2. ANTITANK MINES

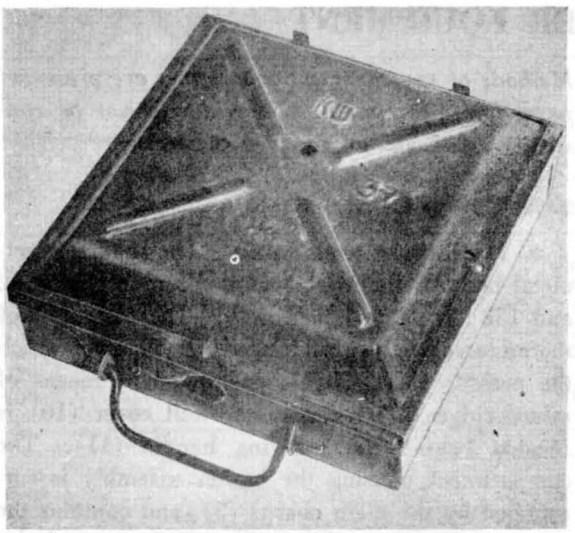
a. M1938 antitank mine. The square, sheet-metal body of the M1938 antitank mine (figs. 152 and 153) is painted field gray. The body (1) of the mine is fitted with a hinged lid (2), over which the pressure plate (3) is positioned by means of raised ridges (4). An igniter well cover (10) is located behind the carrying handle (11). The compartment housing the igniter assembly is surrounded by the main charge (5), and contains the spring-loaded actuating lever (6), the tubular igniter holder (7), and the igniter (8).

A pressure of from 440 to 660 pounds will crush the pressure plate, depressing the plunger (9). Action of the plunger on the actuating lever withdraws the actuating pin, allowing the spring-loaded striker to explode the igniter. A standard pull

Designation	Type	Weight (pounds)	Dimensions (inches)	Type of igniter
M1938 AT mine	AT	9	8.75 by 8.75 by 3.5	Pull.
TM–1935 AT mine	AT	11.56	9 by 8.6 by 3.3	Do.
PMZ–1940 AT–AP mine	AT–AP	[1] 20	11 diameter, 4 height	Pressure.
T–IV AT mine	AT	10.75	8.8 by 8.8 by 4.25	Pull.
TMD–1940 wooden AT mine	AT	11–12	23.6 by 5.6 by 4.1	Do.
TM–1939 metallic AT mine	AT	11.46	23.6 by 5.5 by 4.1	Do.
Post mine	AT	22–33		Do.
Asphalt-cardboard mine	AT	14.5	10.6 diameter. 5.3 height (with igniter).	Pressure.
YAM–5U AT mine	AT	15	19.7 by 7.9 by 4.7	Pull.
YAM–5 AT mine	AT	14.5	19.7 by 5.1 by 4.9	Do.
YAM–5M AT mine	AT	17.1	19.7 by 7.4 by 6.3	Do.
YAM–5K AT mine	AT	17.3	23.6 by 6.9 by 6.3	Do.
Dog AT mine	AT	24		Do.
NV–1941 AT box mine	AT	17.6	7.9 by 9.8 by 5.9	Pressure.
TMD–B AT mine	AT	16.5–17.6	12.4 by 11 by 4.4	Do.
LMG—spigot type AT mine	AT			Pull.
PMK–40 AP mine	AP	[2] 3.2	2.75 diameter, 1.5 height	Pressure-release.
Fragmentation tread mine	AP	7.9	3.1 by 3.1 by 7.7	Pull.
PMD–6 field mine	AP			Do.
AP wooden box electrical mine	AP		8.4 by 7.1 by 2.7	Electric.
AP wooden box mine	AP		6.7 by 4.3 by 2.5 [1]	Pull.
Tread mine	AP			
POMZ–2 AP stake mine	AP	4.4	2.3 diameter, 7.1 height	Do.
AP board mine	AP		23.6 by 3.9 by 4	Do.
OSM–152 fragmentation mine	AP		152-millimeter howitzer projectile.	MV–II.

[1] Approximately.
[2] Ounces.

Figure 151. Primary Soviet mines.



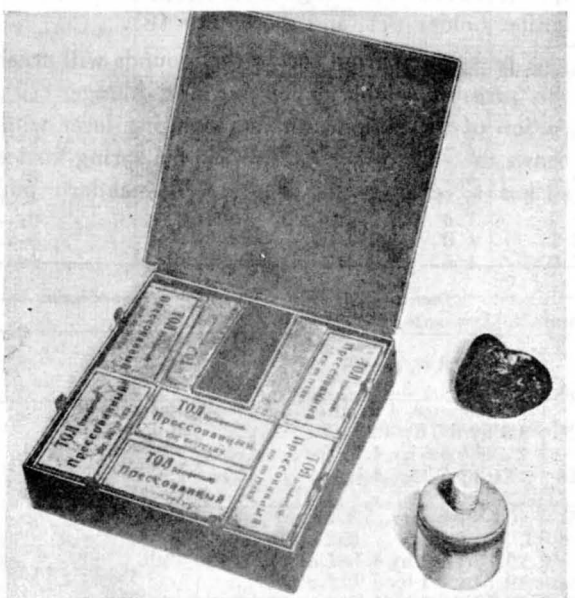


Figure 152. M1938 antitank mine.

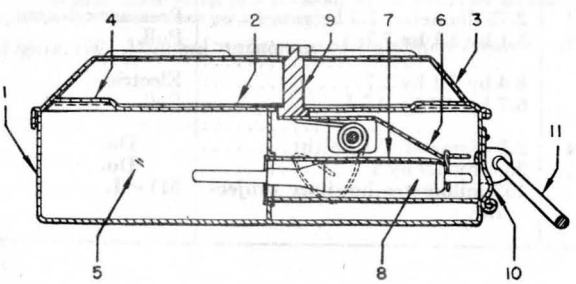


Figure 153. Cross section of M1938 antitank mine.

igniter, known as the "simplified igniter," is used. It is very similar in operation to the German *Z. Z. 42.* The explosive filler is comprised of ½- and 1-pound, rectangular blocks of TNT.

It has been reported that the mine may be neutralized by removing the igniter. This is accomplished by opening the igniter well cover and carefully lifting out the igniter complete with the actuating pin and detonator. Because the igniter actuating pin frequently fits very loosely and may drop out while the igniter is being removed, it is preferable to blast the mine in place.

The mine can be provided with double security against removal. The security devices cannot be detected. It is advisable, therefore, to destroy the mine in place. Antilifting protection can be provided by spring lever action on the base plate, which is neutralized by the weight of the mine. In addition, attempts to withdraw the igniter can be prevented by a detonator positioned directly under the mine lid. This detonator will ignite should the closure cap of the igniter well be opened.

The M1938 mine has been found scattered and in checkerboard-pattern minefields.

CHARACTERISTICS

Dimensions	8¾ by 8¾ by 3½ inches.
Weight (total)	9 pounds.
Weight (explosive)	6 pounds.
Type of explosive	Trinitrotoluol.
Firing pressure (estimated).	440 to 660 pounds.

b. TM–1935 antitank mine. The outward appearance, internal arrangement, and ignition process of the TM–1935 are similar to the antitank mine M1938. The slight differences in the weight and size probably are due to changes made during the 3-year period between the production of the TM–1935 and that of the M1938.

The pressure plate bears the marking "КШ" (Ksh) stamped on the top. Other specimens examined have carried markings of "APM," "T," and other letter combinations.

The Soviets state that neutralization is accomplished in substantially the same as for the later M1938. Should the detonator remain in the mine after the igniter has been removed, it is advisable to destroy the mine in place.

CHARACTERISTICS

Dimensions	9 by 8.6 by 3.3 inches.
Weight (total)	11.56 pounds.
Weight (explosive)	6.7 pounds.
Type of explosive	6 trotyl blocks (1 pound each). 2 trotyl blocks (½ pound each).
Firing pressure (estimated).	550 to 1,500 pounds.

c. PMZ–1940 antitank-antipersonnel mine. The PMZ–1940 (figs. 154 and 155) is a circular pressed-steel mine, olive drab in color. It is somewhat similar in appearance to the German *Tellermine*. By adjustment of the pressure plate, it may be employed in either an antitank or an antipersonnel role. No device for securing against removal has been provided. However, this does not preclude the use of improvised methods against lifting.

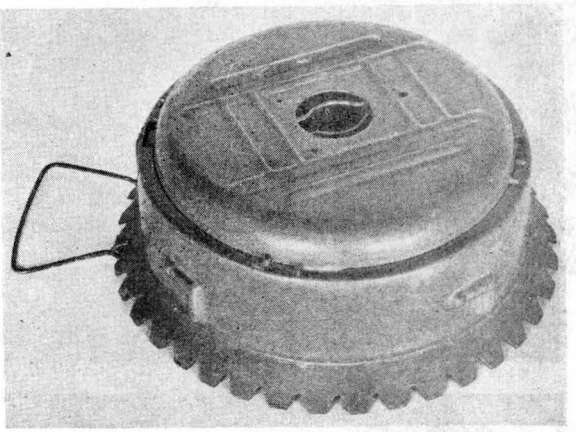


Figure 154. PMZ–1940 antitank-antipersonnel mine.

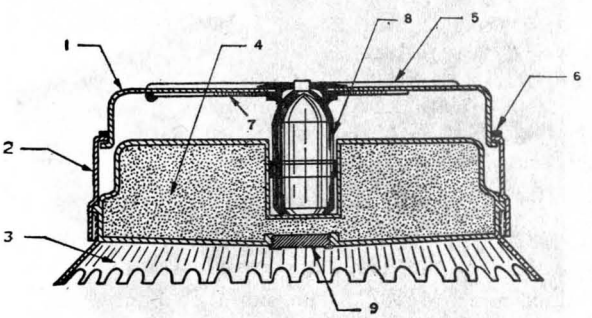


Figure 155. Cross section of PMZ–1940 antitank-antipersonnel mine.

The mine consists of a metal base and charge container (3), pressure plate (1), and inset pressure plate and flanged sleeve (2), which positions and fastens together the pressure plate and the mine body. The mine body contains the explosive charge (4), which is poured through a hole in the bottom. A screw plug seals the hole. The pressure piece is strengthened by several corrugations (5), and is fitted with four locking pins (6), which support the pressure piece and which also act as shear studs. These pins are equally spaced about the outer edge. Their position determines whether the mine will function in an antitank or in an antipersonnel role. A 2-inch hole, in the center of the pressure piece, permits insertion of the igniter assembly (8). A small pressure plate fits over this hole and is held in place by a spring clip (7), which is under the pressure piece. The base is a scalloped steel flange, which probably provides traction when the mine is laid without burying or is laid on ice.

When used as an antitank mine, the PMZ–1940 is armed so that the pressure plate must be crushed by a pressure of at least 500 pounds before any weight is brought to bear on the pressure igniter itself.

When employed as an antipersonnel mine, the pressure plate is rotated until the four pins coincide with corresponding recesses in the mine body, so that no shearing action is involved and so that pressure on the plate is transferred directly to the igniter head.

The igniter head, made of a soft sheet metal, is forced inward when a load is placed on the pressure plate. This forces the striker housing downward. The striker, held by two ball stops, is released and is hurled by the spring to initiate detonation.

Great caution is necessary during the neutralization of this mine. Blasting is preferable. No attempt should be made to rotate the pressure piece. It is reported that the pressure plate can be removed and the igniter withdrawn as follows. When the mine is in the armed position, the pressure plate is held in place by a spring just beneath the pressure piece. Access to this spring is through three small holes in the pressure piece. The mine normally is provided with a special L-shaped key and a U-shaped spreader, designed to spread the spring arms and permit removal of the igniter assembly.

The three small holes are spaced about the central igniter well in the form of an equilateral triangle. The L-shaped key is inserted through the largest of these holes and turned to the left until one arm of the spring can be seen to pass one of the holes. Then one leg of the U-shaped spreader can be inserted. Rotate the L-shaped key in the other direction until the other arm of the spring passes the other hole and the remaining leg of the U-shaped spreader can be inserted. The pressure plate now can be removed and the igniter withdrawn. Three nails can be used to perform the above operation when keys are lacking.

CHARACTERISTICS

Diameter (base flange)	11 inches.
Diameter (mine body)	9¼ inches.
Height	4 inches.
Weight (approximate)	20 pounds.
Weight (explosive) (approximate)	8 pounds.
Type of explosive	TNT.
Firing pressures:	
Antitank	500 pounds.
Antipersonnel	50 pounds.

d. T–IV antitank mine. The flat wooden or metal T–IV antitank mine (figs. 156, 157, and 158) is similar in operation to the antitank mine M1938, and uses the same pull (simplified) igniter. The weight and dimensions vary according to whether the construction is of metal, wood, or a combination of both. The combination construction, which appears to be encountered most frequently, employs a metal body and a wooden pressure plate. The size of wooden pressure plates may vary by from 1 to 2 inches in length and width.

The body of the mine is fitted with a hinged lid, which allows the mine to be opened for inspection. The pressure plate is positioned by bolts passing through the pressure plate and into the lid of the mine. Springs are used occasionally instead of bolts (fig. 157). The compartment housing the igniter assembly is surrounded by the main charge. It contains the spring-loaded actuating lever, tubular igniter holder, and the igniter. The plunger post rests on the actuating lever. An igniter well cover is located behind the carrying handle. Pressure on the lid depresses the plunger post in the all-wooden mine (in newer models, the post also is provided with a wooden pin to give better security against unintentional detonation), thus rotating the actuating lever about its pivot. This action withdraws the actuating pin from the igniter and detonates the mine. The simplified igniter fires on withdrawal of the actuating pin, which restrains a spring-loaded striker, similarly to the operation of the German *Z.Z. 42.*

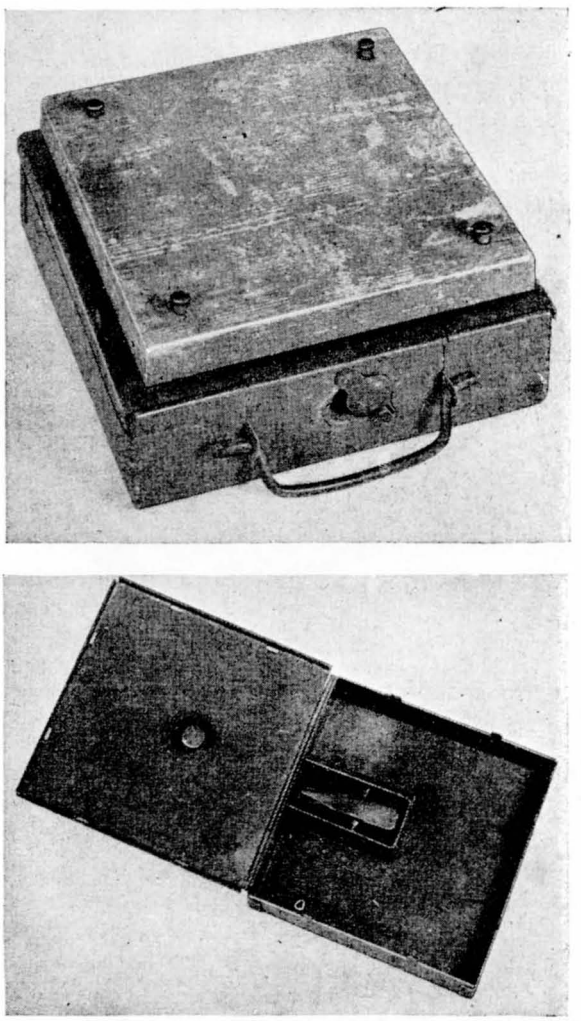


Figure 156. T–IV antitank mine.

It is reported that neutralization can be accomplished as follows: Open the igniter well cover. Carefully remove the igniter, complete with actuating pin and detonator. Destruction in place is recommended due to frequent firing of the igniter because of loose fitting actuating pins.

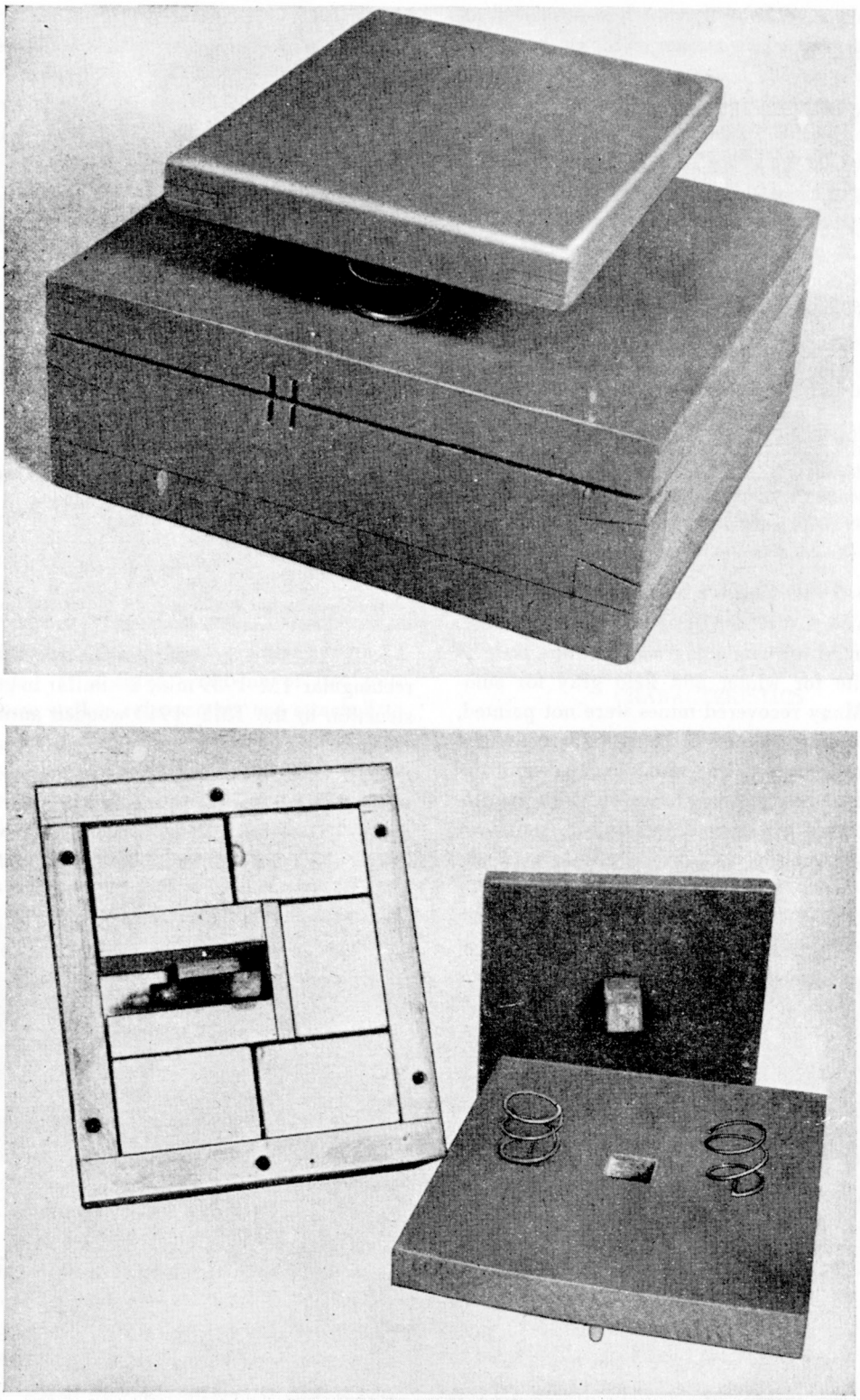


Figure 157. Spring-supported pressure plate assembly for T–IV antitank mine

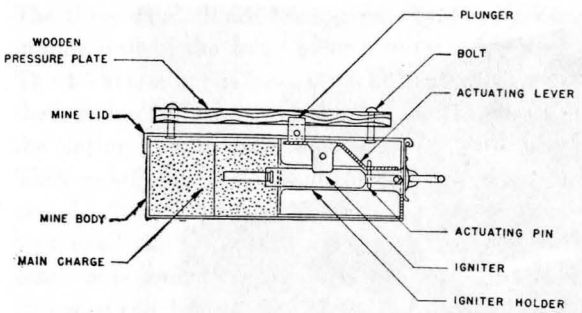


Figure 158. Cross section of T–IV antitank mine.

CHARACTERISTICS

(Metal body, wooden pressure plate model)

Dimensions[1]	8.8 by 8.8 by 4¼ inches.
Weight (total)	10¾ pounds.
Weight (explosive)	5¾ pounds.
Type of explosive	Trinitrotoluol.
Firing pressure (estimated)	200 to 550 pounds.

[1] Generally, the wooden dimensions are slightly smaller.

e. TMD–1940 wooden antitank mine. The TMD–1940 (figs. 159 and 160) is a plywood mine, usually painted for camouflage. The mine body is painted white for winter and field gray for summer use. Many recovered mines were not painted, probably because of lack of time. No method is provided for securing the mine against removal. The mine has been found, however, with supplementary charges placed underneath.

The mine consists of a rectangular wooden chest fitted with a trapezoidal lid, explosive charge, two pull (simplified) igniters with detonators, and two igniter boxes. Although the igniters are pull igniters, they are arranged to fire when pressure is applied to the lid. The charge contains seven ½-pound and four 1-pound blocks of explosive. A pressure of from 550 to 900 pounds depresses the lid. A tilting lever withdraws the safety pin and releases the striker, which fires the detonator.

According to the Soviets, neutralization can be accomplished by opening one side wall of the mine and cautiously removing the igniter. The other side wall then is opened, and the second igniter is removed.

CHARACTERISTICS

Dimensions[1]	23.6 by 5.5 by 4.1 inches.
Weight[1]	11 to 12 pounds.
Weight (explosive)	7.9 pounds.
Type of explosive	Trotyl.
Firing pressure	550 to 900 pounds.

[1] The dimensions and weights vary with the different types and sizes of woods used in the manufacture of the mine.

f. TM–1939 metallic antitank mine. The rectangular TM–1939 mine is similar in general construction to the TMD–1940 wooden antitank mine. However, it contains only one pull igniter. Although the igniter is of the pull type, it is activated by pressure forcing the plunger or bolt down. This, in turn, depresses a lever which withdraws the safety pin and detonates the mine.

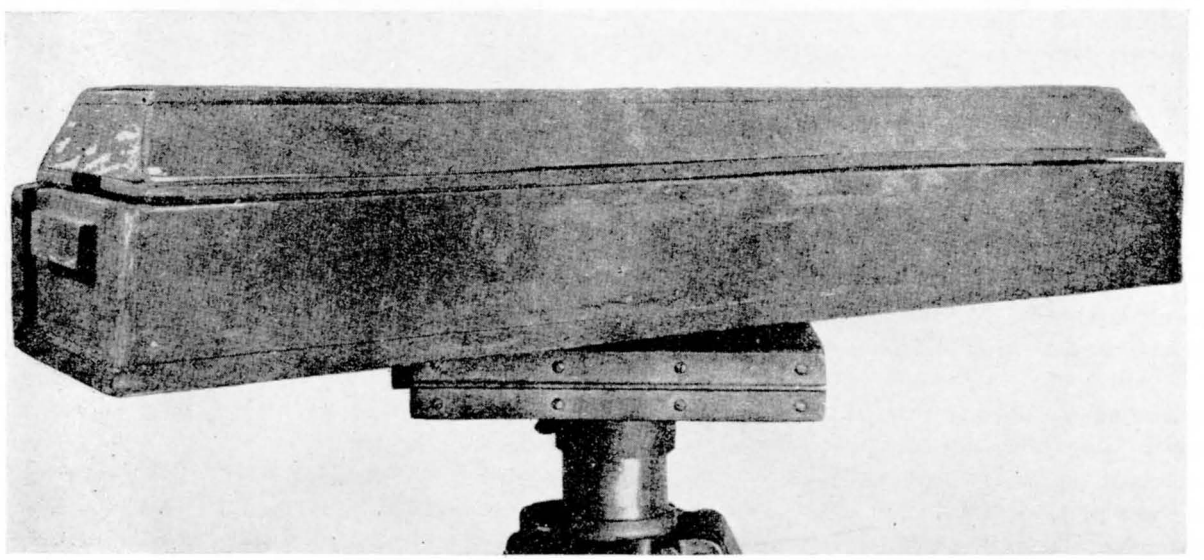


Figure 159. TMD–1940 wooden antitank mine.

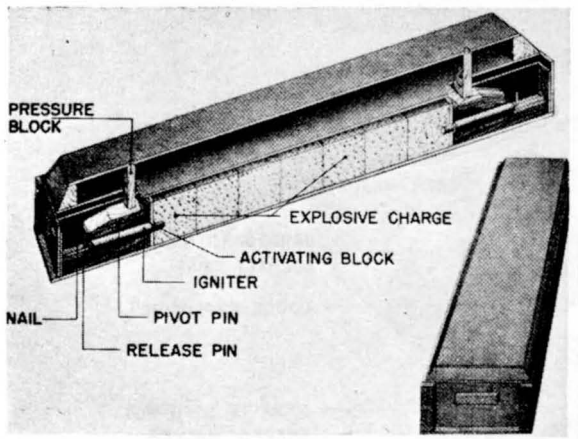


Figure 160. Cross section of TMD–1940 wooden antitank mine.

CHARACTERISTICS

Dimensions	23.6 by 5.5 by 4.1 inches.
Weight (total)	11.46 pounds.
Weight (explosive)	7.9 pounds.
Firing pressure	660 to 1,100 pounds.

g. Post mine. The post mine consists of a buried, wrapped explosive charge weighing from 22 to 33 pounds. It is fitted with one or two pull igniters, whose striker release pins are attached to a stake by means of wire. The stake extends approximately 25 inches above the ground. It is buried loosely, so that it will tilt, but not break, when struck. The igniters will detonate the mine when pressure is applied from either of two directions. Generally, one igniter is placed in the upper portion of the charge and the other igniter in the lower portion, thus allowing a pull in either directon to activate the mine.

Posts usually are well camouflaged, and the mines frequently are employed in long grass, in grain fields, or under water.

h. Asphalt-cardboard mine. The asphalt-cardboard mine (fig. 161) is painted a brownish black, and is similar in operation and construction to the *Tellermine 42*. The function of the pressure lid in the *Tellermine* is fulfilled by the flexibility of the body of this mine.

The mine body is composed of two pot-shaped cardboard halves, saturated with asphalt or tar for waterproofing and camouflage. The joint between the box and lid is sealed with tape and asphalt. Five wooden strips, placed inside the pot halves, reinforce the mine body. The igniter socket, which can be closed and waterproofed by a glass closure screw and a rubber washer, is in the center of the upper part of the container. The explosive charge is poured through the filling hole, which then is sealed with cardboard and asphalt. The ignition booster is cemented with asphalt to the base of the igniter socket, the detonator extending into the ignition charge. The pressure igniter operates similarly to the German *DZ.35* type A. The detonator is screwed into the igniter only when the mine is being laid. When pressure is exerted on the mine, the pressure hood of the igniter is telescoped, releasing the striker and detonating the mine.

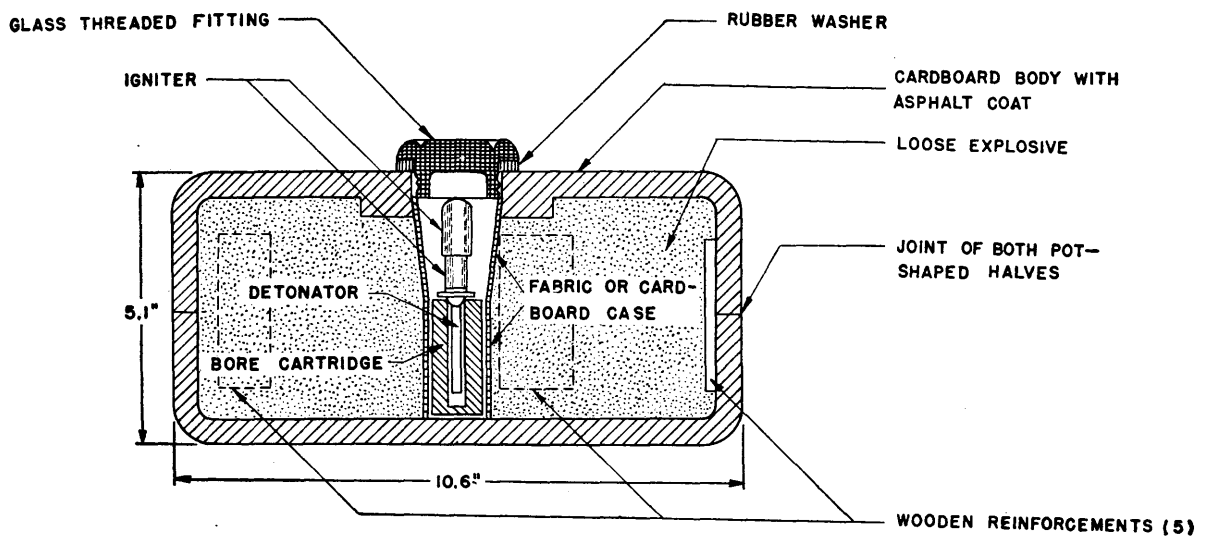
The Soviets developed this type of mine to preclude the use of metallic-mine detectors. However, it is reported that the German *Frankfurt 42* detector can locate this type of mine with comparative ease.

It is believed that the mine cannot be picked up. The mine is uncovered and destroyed in place, care being exercised not to exert pressure on the lid.

CHARACTERISTICS

Diameter	10.6 inches.
Height:	
With igniter	5.3 inches.
Without igniter	5.1 inches.
Weight (total)	14.5 pounds.
Weight (explosive)	11 pounds.
Type of explosive	Granular ammonite.
Firing pressure (approximate).	26 pounds.
Ignition charge	1.7-ounce bore cartridge.

i. YAM–5U antitank (large box) mine. The YAM–5U (figs. 162 and 163) consists of a green-painted wooden box, fitted with a wooden lid which is supported on one side only. A wooden flange is fitted to the lid, along the unsupported side. This flange is connected to the safety pin of a pull (simplified) igniter. Pressure on the lid is transmitted down a wooden pin, which withdraws the striker release pin and detonates the mine. A thick wooden plate is attached to the upper surface of the lid to insure that pressure will be directed on to the unsupported side. A wooden block is attached to the under-surface of the lid to maintain the lid and the body in their correct relative positions.



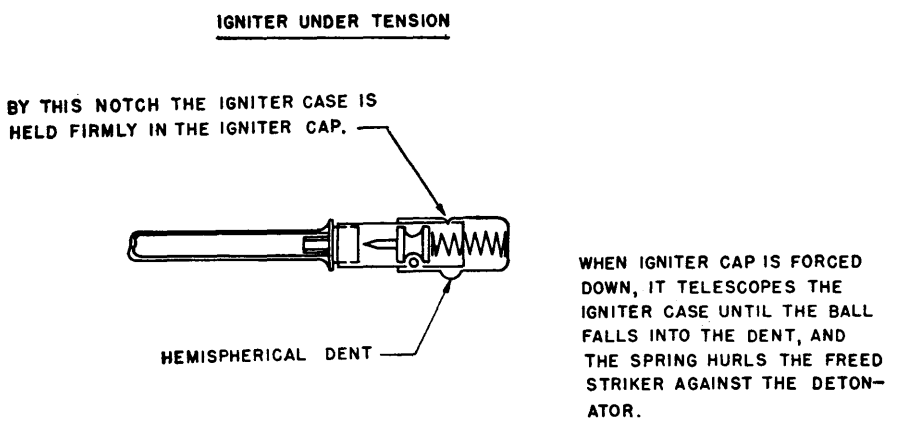


Figure 161. Cross section of asphalt-cardboard mine.

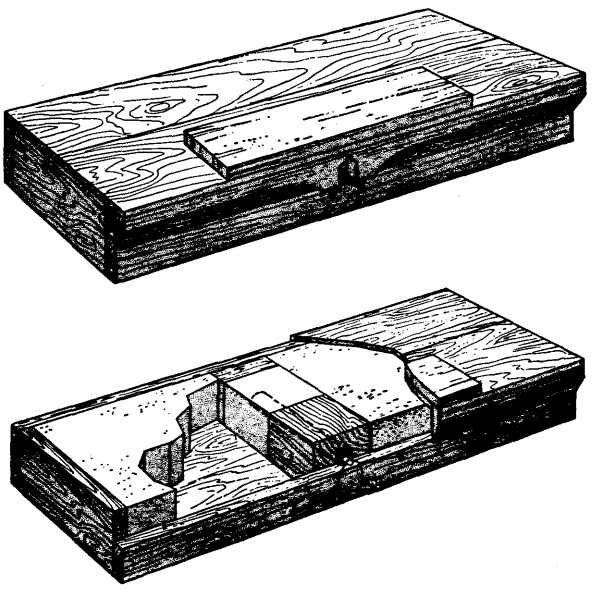


Figure 162. YAM–5U antitank (large box) mine.

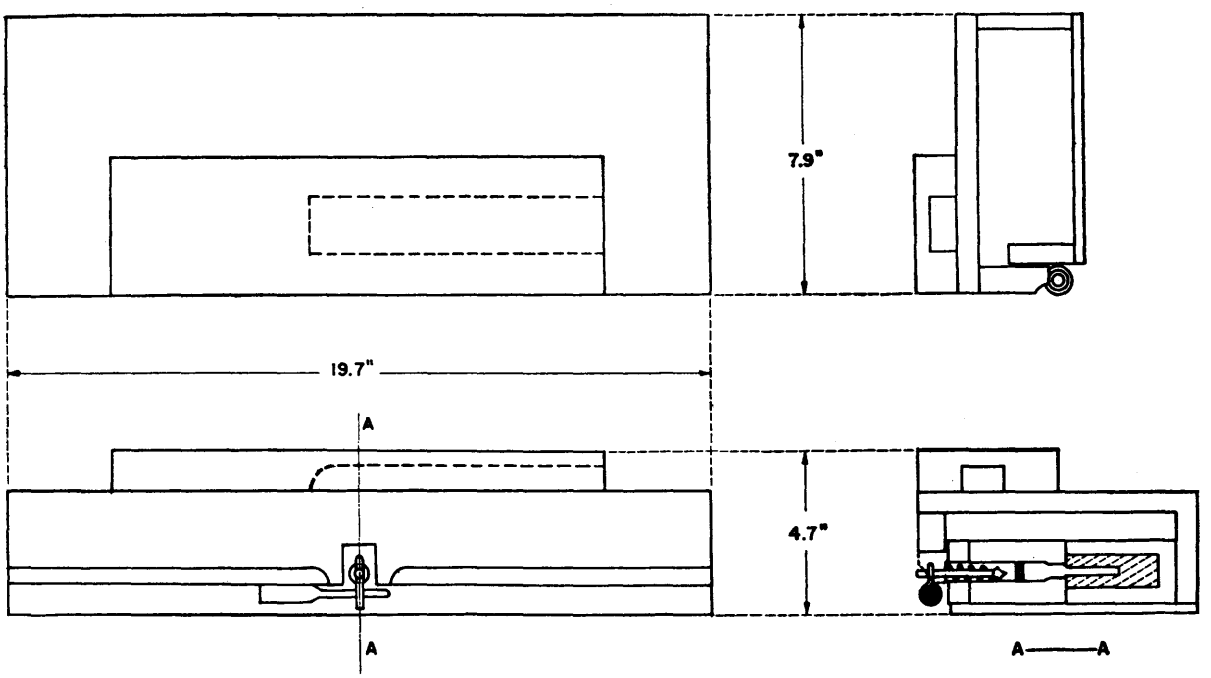


Figure 163. Cross section of YAM–5U antitank (large box) mine.

Although no antilifting device is incorporated in the mine, several improvised methods are believed to exist.

CHARACTERISTICS

Dimensions	19.7 by 7.9 by 4.7 inches.
Weight (total)	13 to 15 pounds.
Weight (explosive)	11 pounds.
Type of explosive	Pressed TNT.
Firing pressure	300 to 880 pounds.

Other mines in the YAM–5 series and their characteristics are as follows:

	YAM–5	YAM–5M	YAM–5K
Dimensions (inches)	19.7 by 5.1 by 4.9	19.7 by 7.4 by 6.3	23.6 by 6.9 by 6.3.
Weight (pounds)	14.5	17.1	17.3.
Weight (pounds explosives)	8.3	11	11.
Type of explosive	Amatol 80/20	Dynamite or amatol 80/20	Dynamite or amatol 80/20.
Booster	½ pound trotyl	½ pound trotyl	½ pound trotyl.
Remarks	No pressure piece; AT mine.	Short pressure piece; AT mine.	Long pressure piece; AT mine.

j. Dog antitank mine. During World War II, the Soviets employed explosive charges, strapped to the backs of large dogs, with considerable success against hostile tanks. Each dog carried approximately 24 pounds of explosives, contained in two saddle bags suspended on either side of its body (fig. 164).

An 8-inch rod, pivoted at the base, projects above the dog's body and activates pull igniters positioned in the explosive charges (fig. 165).

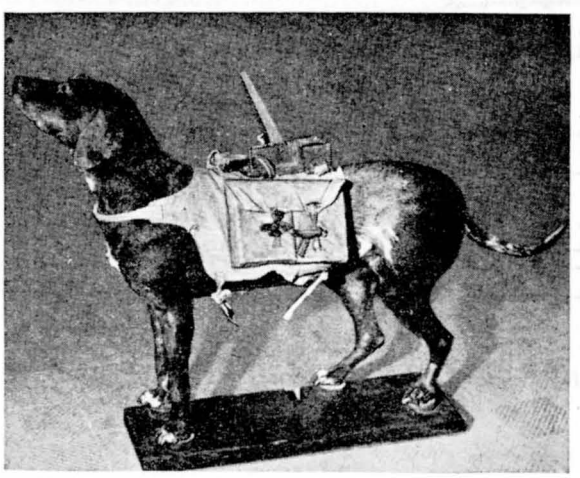


Figure 164. Dog antitank mine.

Dogs were trained to crawl beneath tanks, where the rod would strike against the belly of the tank and detonate the mine.

k. NV–1941 antitank box mine. The NV–1941 (fig. 166) is housed in a rectangular wooden box fitted with a trapezoidal-shaped lid. Because of the nature of construction, some variations will be noted in size and in weight.

A pressure plate is housed beneath the lid, and a pressure post, attached to it, extends down into the mine body. The pressure post is upheld by a spring placed between the pressure plate and the upper surface of the mine body. The spring-loaded striker and detonator are contained in a horizontal cavity, on opposite sides of the pressure post. A small trip lever, attached to the lower end of the pressure post, holds the striker in the cocked position.

When the mine lid is crushed, the pressure post is depressed and the trip lever is raised, allowing the striker to be driven against the detonator. A vertical cavity in the base of the mine holds an electric detonator for detonation by remote control when desired. An antilifting wire, which is at-

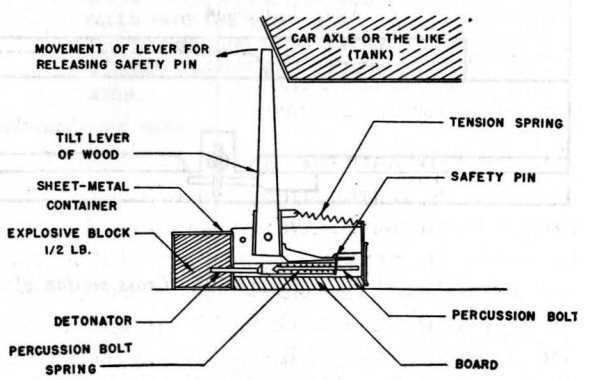


Figure 165. Detonator assembly of dog antitank mine.

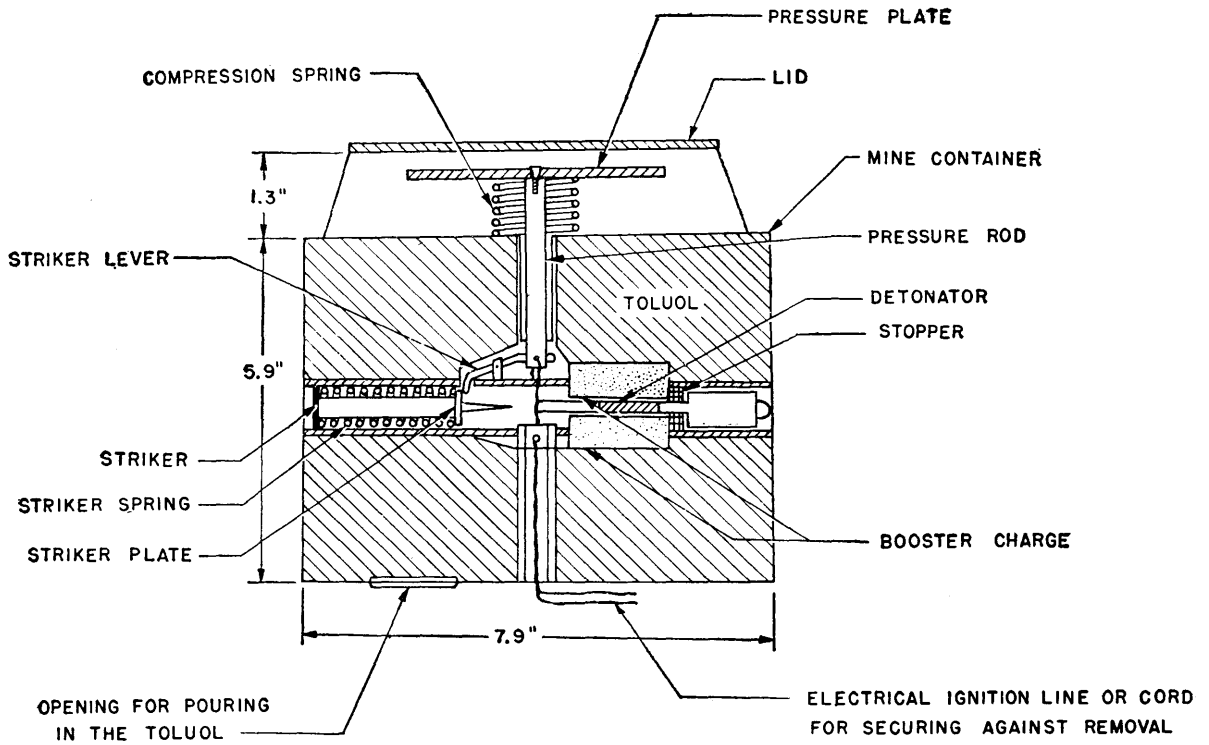


Figure 166. Cross section of NV–1941 antitank box mine.

tached to the base of the pressure post, passes through this cavity and is anchored in the ground underneath the mine. Mines thus prepared will detonate when lifted.

It is reported that the mine may be removed by first detaching any antilifting wire or other device, unscrewing the stopper in the side of the mine which closes the detonator cavity, and removing the percussion detonator. Cables of mines prepared for remote control electric detonation are to be cut.

CHARACTERISTICS

Dimensions ..... 7.9 by 9.8 by 5.9 inches.
Weight (total) ..... 17.6 pounds.
Type of explosive ..... Toluol.

l. TMD–B antitank mine. The TMD–B is housed in an approximately square wooden box, painted a camouflage color in summer and white in winter. A carrying strap is provided at one end of the box. The box is constructed of lumber approximately 0.4 inch thick. An igniter well and a booster are positioned in the center of the floor of the box. Explosive charges are placed on both sides of the booster charge. A thin wood partition separates the charges and the igniter from the lid of the box. Only the head of the MV–5 pressure igniter protrudes through the partition. The lid is notched on the under side and near the ends to allow it to crush or shear easily. There is a rectangular hole in the center of the lid, directly over the head of the igniter. Three pressure boards are positioned on the top of the lid. The center board is placed over the rectangular hole and has a pressure piece on the under side, which fits in the hole in the lid and has a curved recess in which the igniter head rests.

Force on the pressure boards shears the lid, telescopes the igniter head, and detonates the mine.

CHARACTERISTICS

Dimensions ..... 12.4 by 11 by 4.4 inches.
Weight (total) ..... 16.5 to 17.6 pounds.
Weight (explosive) ..... 10.3 to 12.1 pounds.
Type of explosive ..... Amatol, dynamite, or ammonite.

m. LMG spigot (rocket) type antitank mine. The LMG (fig. 167) consists basically of a crudely constructed hollow charge projectile and a

launcher in the form of a spigot tube mounted on a wooden baseplate. The weapon is intended for short range use against tanks, and is operated by a pull wire, which either may be laid across the path of the vehicle or may be operated manually from an observation post.

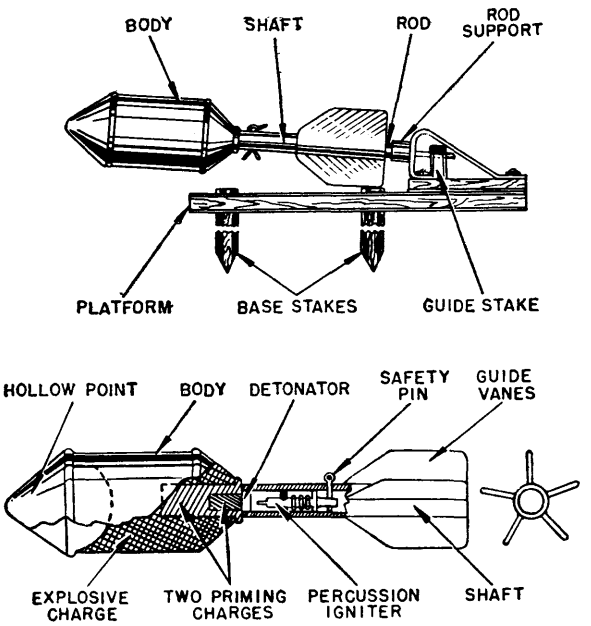


Figure 167. Cross section of LMG spigot (rocket) anti-tank mine.

The projectile, which appears to be constructed of sheet metal, consists of a cylindrical body, containing the explosive charge and two primer charges, and a finned tail unit. The body is conical at either end and is screwed on to the shaft of the tail unit. The forward end of the charge is concave and the conical nose is hollow. In the rear of the main charge are two primer charges, the rear portions of which bear against a percussion igniter assembly in the shaft of the tail unit. The tail unit consists of a hollow shaft, attached to the rear portion of which are five guiding fins. The percussion igniter, in the forward end of the shaft is maintained in a "safe" position by a safety pin passing through the shaft. The shaft fits over the spigot tube of the launcher.

The launcher consists, gasically, of a spigot tube, a stirrup support, and a wooden baseplate. At its lower end, the spigot tube is strengthened by a collar and contains a 15-ounce powder charge with a rifle cartridge detonator. The strengthening collar, which gives a chamber effect to the tube, is grooved to fit into a supporting block welded to the vertical part of the stirrup, screwed on to the baseplate. A pull igniter is screwed to the rear of this section of the stirrup and bears against the charge in the base of the spigot tube. Pull wires run from the igniter around guide pegs in either side of the baseplate. The pull wires may be fastened as desired. Two other pegs, in the forward end of the baseplate, serve to position the projectile at the forward end.

The launcher is laid and pegged in position on the ground and the pull wires are connected as required. The projectile then is placed over the spigot tube, and the safety pin is removed. Tension on either of the pull wires will activate the simplified igniter, ignite the propelling charge, and launch the projectile from the spigot tube. The projectile is detonated on impact by the percussion igniter in the shaft of the tail unit. A penetration of 4 inches of armor plate is claimed. It is reported that this weapon may be disarmed by cutting the pull wires, removing projectile from spigot tube, and unscrewing tail shaft from body of projectile.

3. ANTIPERSONNEL MINES

a. PMK–1940 antipersonnel mine. This dark brown circular mine (figs. 168, 169, and 170) can be of cardboard or of sheet metal construction. The cardboard type has been recovered to date.

The mine consists of a removable cover, a pot-shaped charge case, and a thin cardboard partition, which separates the case from the cover and which

is sealed along the outer circumference. The charge case contains a simple pressure-release igniter and the explosive charge. A hole in the side of the body, through which the mine may be disarmed by removing the detonator, is fitted with a rubber plug. The detonator is inserted into this hole, which extends through the diameter of the case. At one end of the cavity, in line with the detonator, is a percussion cap backed by a spring-loaded striker. The cardboard body is treated with oil or paraffin.

The sheet metal mine is similar, except that it has a safety device not found in the cardboard version. The safety consists of a rod running parallel to the detonator and just below it. When pushed forward, the rod engages the lower portion of the pressure-release slide, preventing it from moving down under pressure and releasing the spring loaded striker.

Pressure on the top crushes the cover and pivots the lever, thus releasing the striker. The sheet metal mine operates in a similar manner, except that the pressure release mechanism is not a lever, but is a slide with an aperture through which the striker moves.

It is reported that the mine can be neutralized by removing the rubber plug from the detonator well and extracting the detonator.

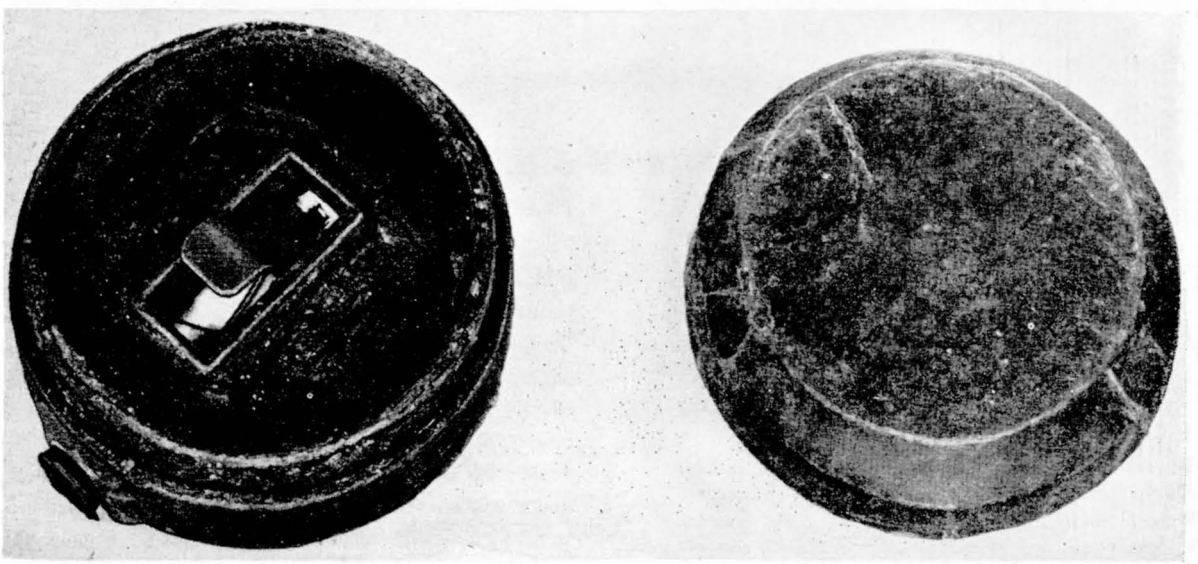


Figure 168. Cardboard PMK–1940 antipersonnel mine.

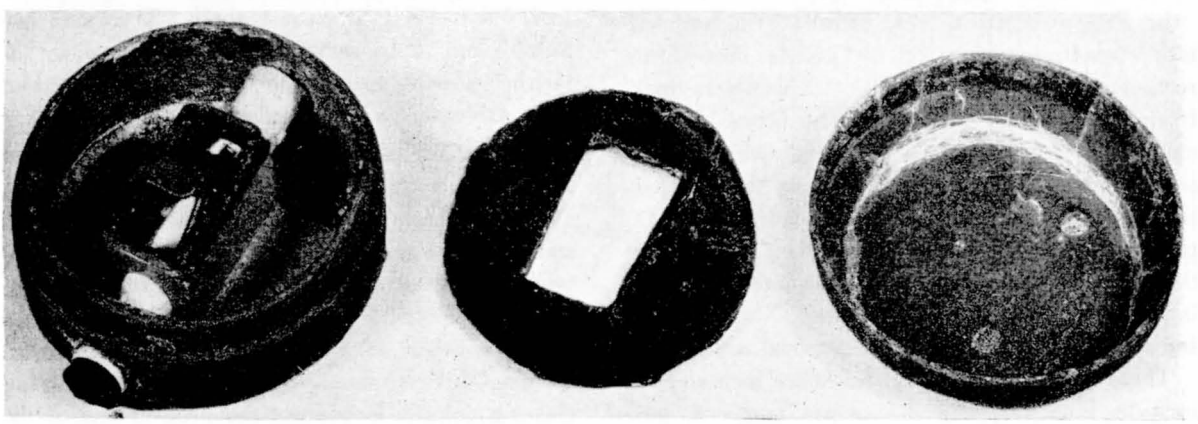


Figure 169. Construction of cardboard PMK–1940 antipersonnel mine.

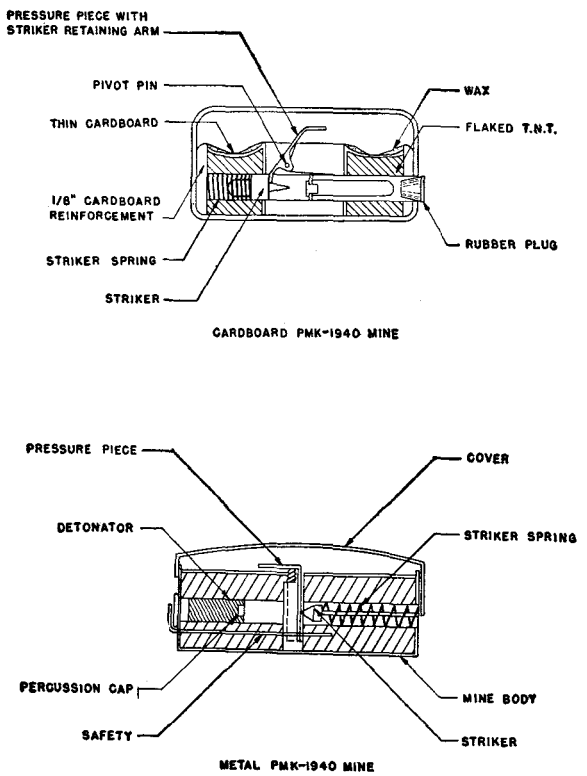


Figure 170. Cross section of PMK–1940 antipersonnel mine.

CHARACTERISTICS

Diameter	2¾ inches.
Height	1½ inches.
Weight (total)	3.2 ounces.
Weight (explosive)	1.7 ounces.
Type of explosive	Flaked TNT.
Firing pressure	20 to 40 pounds.

b. Fragmentation tread mine. The fragmentation tread mine (figs. 171 and 172) is housed in a rectangular box of sheet metal, 2 millimeters thick. It employs a contact igniter. The boxes also are made of wood. Consequently, weights and dimensions may vary slightly, depending on the construction of the mine. The mine is filled with an explosive charge and steel fragments. The base of the box is strengthened by a base plate. A carrying handle is attached to the side. No provisions for securing the mine against removal are known.

There are two sheet-metal tubes 0.6 inch and 0.4 inch in diameter, and 3.5 inches long. A pull (simplified) igniter with detonator is inserted into the larger tube. The contact post is inserted into the smaller tube. The contact post has three prongs on top and is split into a fork at the bottom. A piece of tape is fastened to the detonator pin and through the fork of the contact post. This igniter, in effect, corresponds to the German S-mine igniter.

The igniter and the contact post are inserted immediately prior to planting. When the contact post is stepped on, the tape withdraws the detonator pin and explodes the mine.

It is reported that the tape must be cut, without the exertion of any pull, and the contact post and igniter withdrawn before the mine is removed. If the tape is not cut, the contact post must be withdrawn carefully and separated from the tape. The igniter then is removed.

CHARACTERISTICS

Dimensions	3.1 by 3.1 by 7.7 inches.
Weight (total)	7.9 pounds.
Weight (explosive)	1 pound.

c. PMD–6 field (infantry) mine. The PMD–6 (fig. 173) is a rectangular wooden mine, painted green. It is housed in a box with an overlapping lid, which is fastened to the body with a hinge. The lower edges of the lid rest on the ends of the striker release pin, which are bent at right angles to the igniter. The lid has a long slot in the center of the lower edge on the front side which accommodates the igniter head. When pressure is exerted. the lid forces out the striker release pin and detonates the mine.

It is reported that the explosive charge can be replaced by a light mortar shell. The mine has been found to be secured against removal by attaching a wire or cord to the safety pin with a stake driven in beside the mine.

d. Antipersonnel wooden box electrical mine. This approximately square gray mine (fig. 174) has a body which is divided into a large and a small compartment. The large compartment contains the explosive, and the small compartment contains an electrical ignition device. The ignition device consists of a dry cell, two stirrups with springs, three contacts, and a plug. One stirrup closes a contact to connect the plug to one of the two poles of the battery. The other stirrup is con-

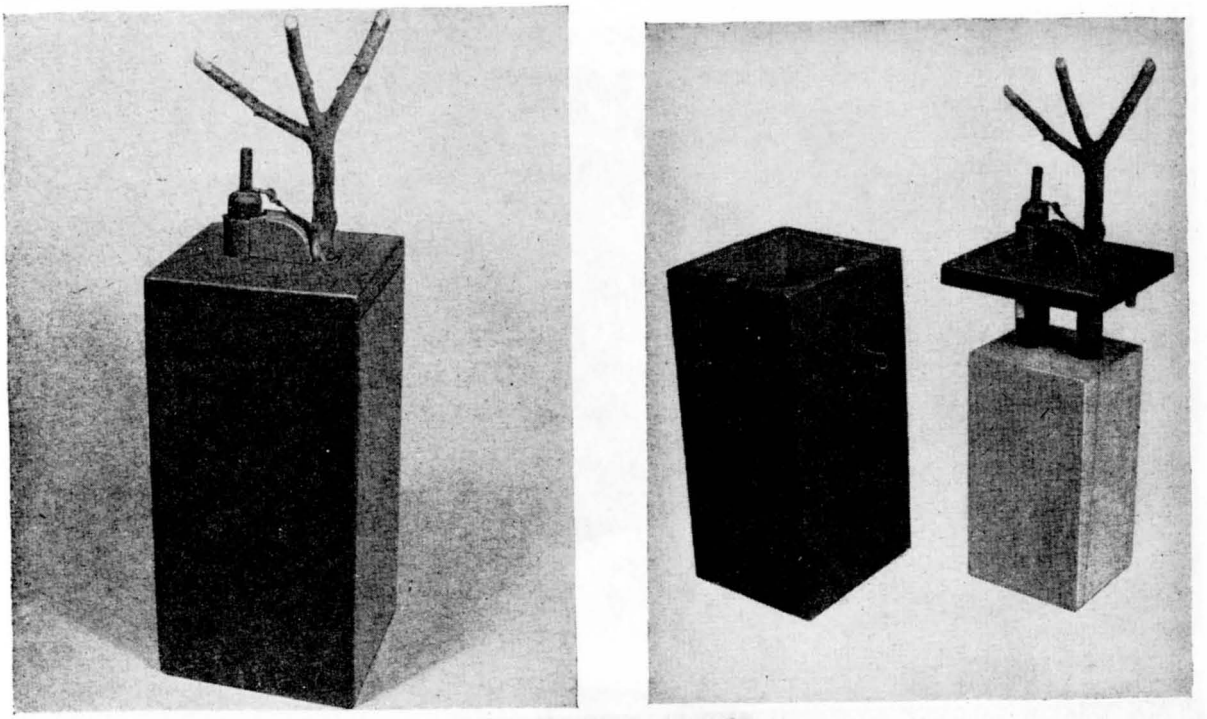


Figure 171. Fragmentation tread mine.

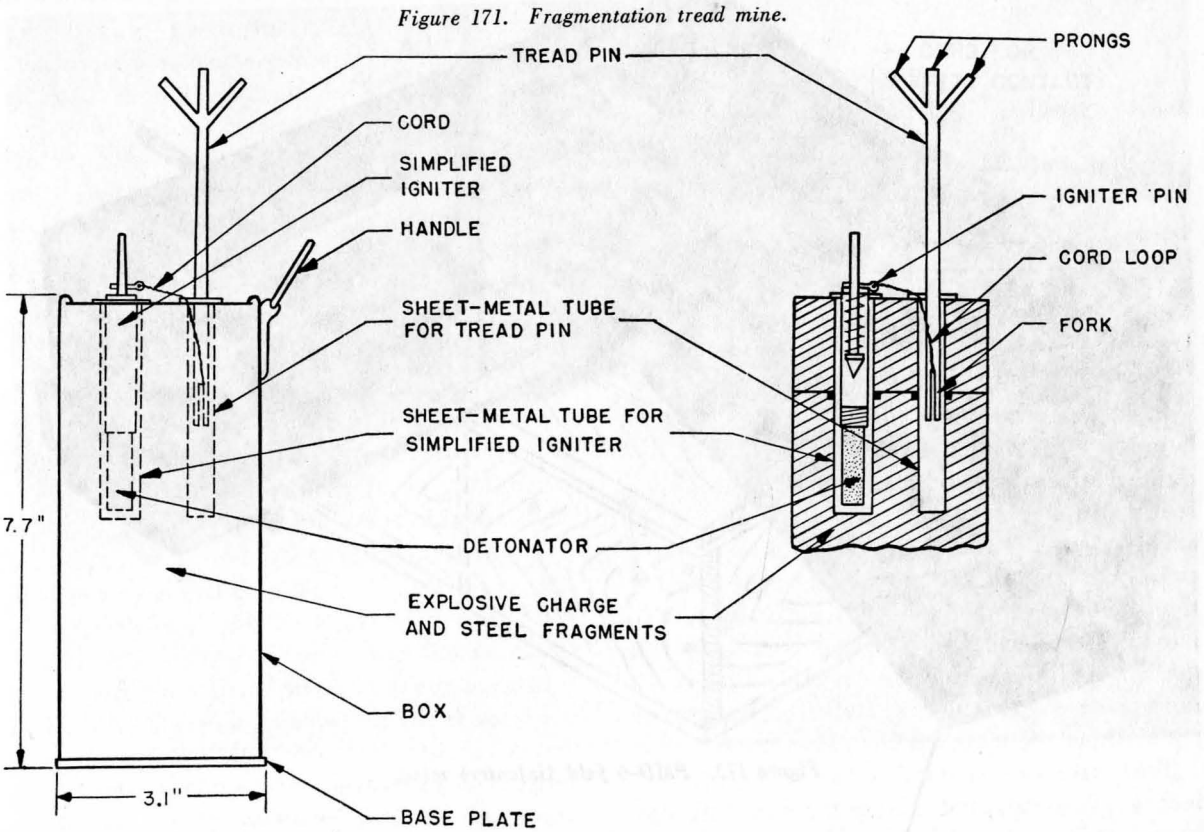


Figure 172. Cross section of fragmentation tread mine.

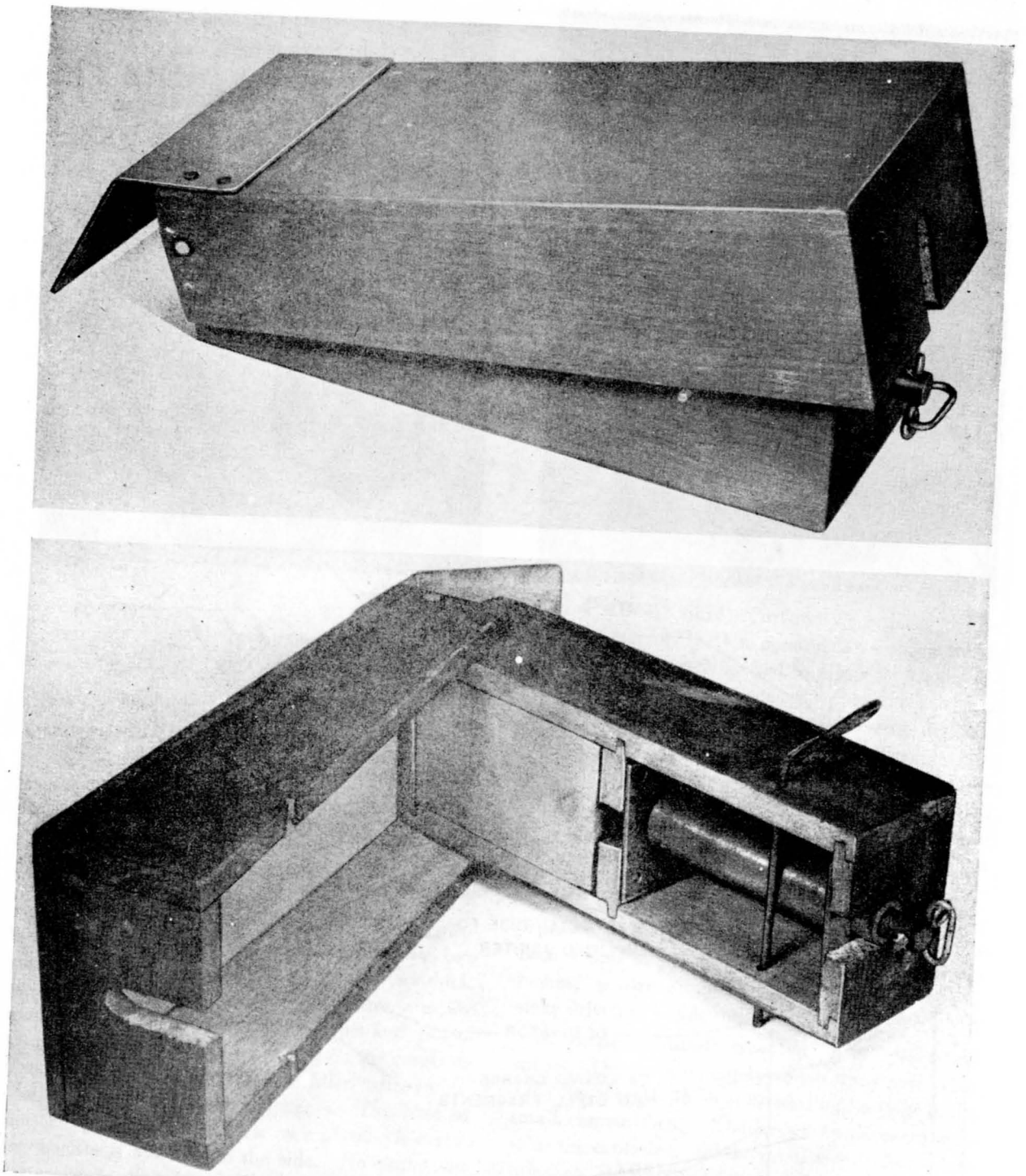


Figure 173. PMD–6 field (infantry) mine.

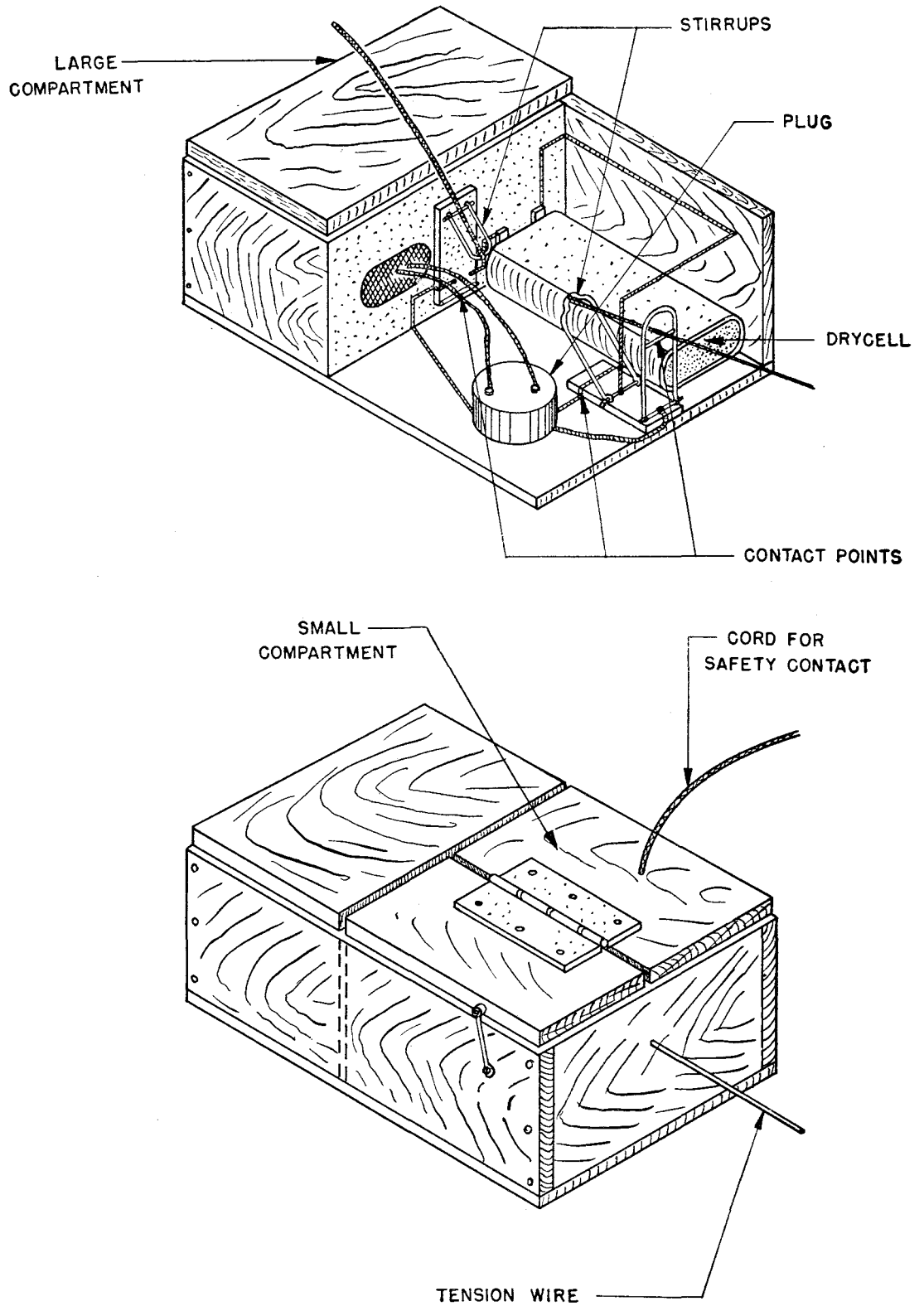


Figure 174. Cross section of aintipersonnel wooden box electrical mine.

nected to the remaining pole of the battery, and can close either of two contacts to complete the circuit to the plug. A hinged lid over the small compartment permits installation of a pull or cutting arrangement for firing the mine.

During installation, the safety stirrup in the center of the mine is raised and is fastened with a string as a precaution against premature detonation. The stirrup inside the end of the box is held midway between two remaining contacts by a tension wire. The circuit wires of the low-tension igniter are connected to the plug. The string holding the safety stirrup then is released. The circuit now is interrupted only by the second stirrup. A pull on the tension wire holding the stirrup midway between the two contact points will close the circuit by raising the stirrup to touch the upper contact point. Similarly, if the tension wire is cut the stirrup is forced by its spring against the lower contact point to close the circuit.

Because the mine is very sensitive, it is recommended that it be destroyed in place.

CHARACTERISTICS

Dimensions ---------- 8.4 by 7.1 by 2.7 inches.
Weight (explosive) ------ 2.6 pounds.

e. Antipersonnel wooden box mine. The plywood box of this mine (figs. 175 and 176) is rectangular in shape and is fitted with a removable lid, which is positioned by four small dowel projections which fit into recesses in the box. The box contains a pull igniter, which is positioned by a block of wood, and an explosive charge. The igniter is taped to the block. A hole in the center of the lid allows a wooden pressure post to protrude approximately three-fourths of an inch. A fulcrum is positioned, on the lid, above the igniter and between the pressure post hole in the lid and the striker release pin of the igniter. A lever passes through the fulcrum, and one end is fastened to the striker release pin and the other end to the pressure post. Although a pull-type igniter is used, the igniter is actuated by downward movement of the pressure post which, through the pivot action of the fulcrum, withdraws the striker release pin.

It is reported that a variation employs a wooden friction igniter and a cardboard detonator. The mine measures approximately 6.7 by 4.3 by 2.5 inches.

f. Tread mine. Reports indicate that the Soviets employ a large number of variations of tread mines. In addition to six known models, many improvised versions are listed. Later models indicate improved design over those of earlier manufacture.

One of the more important models consists of a rectangular wooden box containing the explosive charge in one end, and a pull igniter in the other (fig. 177). A treadboard is inclined over a block of wood attached on top of the box. This block acts as a fulcrum, and is situated approximately one-third of the distance from the igniter end of the box. The striker release pin of the igniter is attached by a wire to the depressed end of the treadboard. Pressure on the elevated end of the treadboard raises the depressed end of the board, removes the striker release pin, and detonates the mine.

Another version consists of a rectangular wooden box, two rollers supporting the treadboard at either end (fig. 178). The treadboard is flush with the top of the box. A pull igniter is positioned in a wooden retaining block attached to the bottom of the box. A loop of cord is attached to the igniter striker release pin and passes over both rollers. When the treadboard is broken, the horizontal portion of the cord immediately below the treadboard is depressed, thus applying tension to the ends of the loop, withdrawing the striker release pin, and detonating the mine.

Other variations include electrical ignition devices, the circuit being closed by pressure on the treadboard (fig. 179).

g. POMZ–2 antipersonnel stake mine. The POMZ–2 (figs. 180 and 181) consists of a deeply scored, cylindrical cast iron body, an explosive cartridge with a detonator well, and a pull igniter with detonator. The mine is seated on top of a 10-inch anchor stake, which may be driven in the ground or attached to trees or other objects.

The body of the mine is provided with an upper and lower cavity. The upper cavity accommodates the igniter, to which one or two trip wires are attached. The explosive cartridge is inserted in the lower cavity and is retained by the head of the anchor stake.

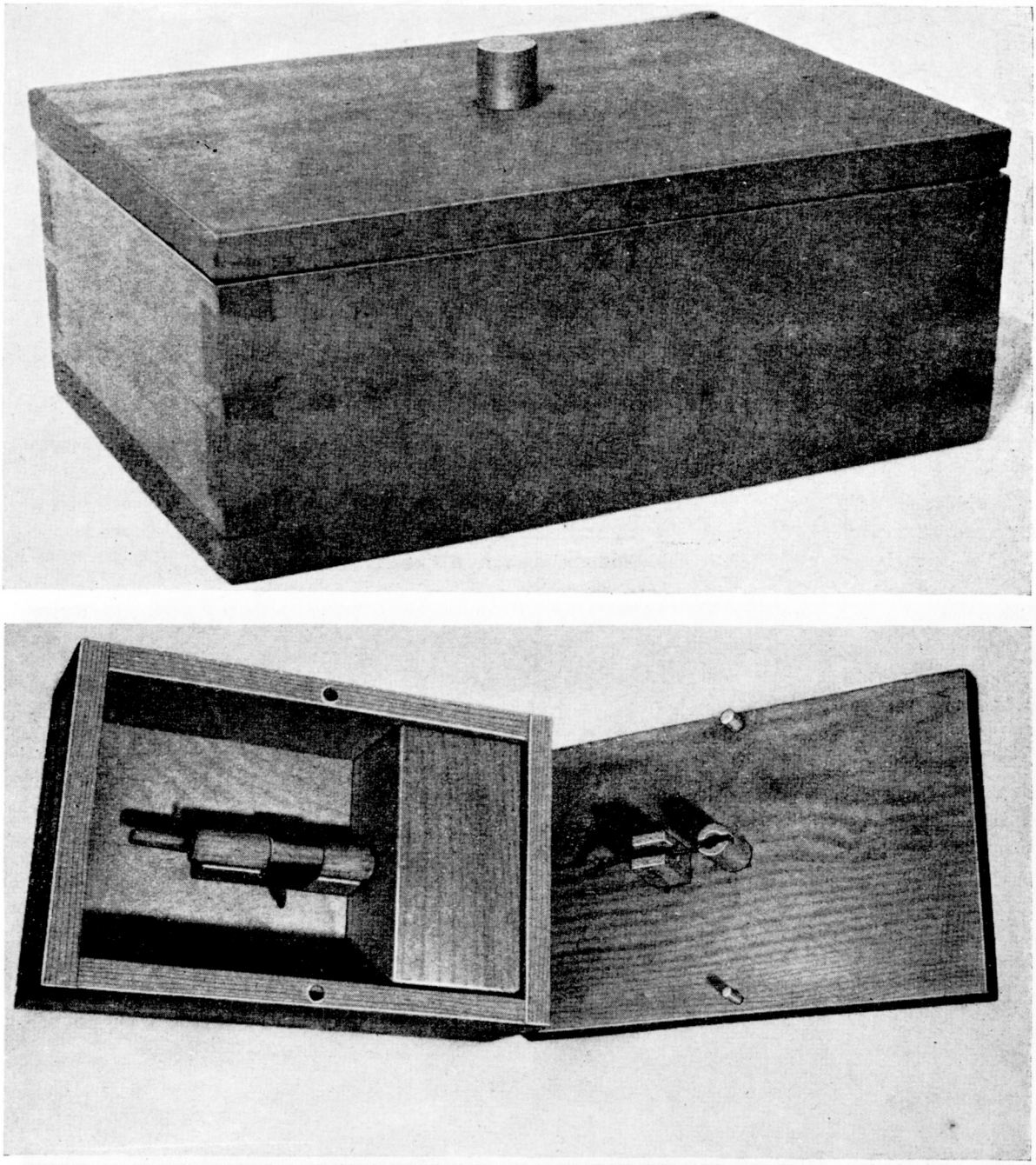


Figure 175. Antipersonnel wooden box mine.

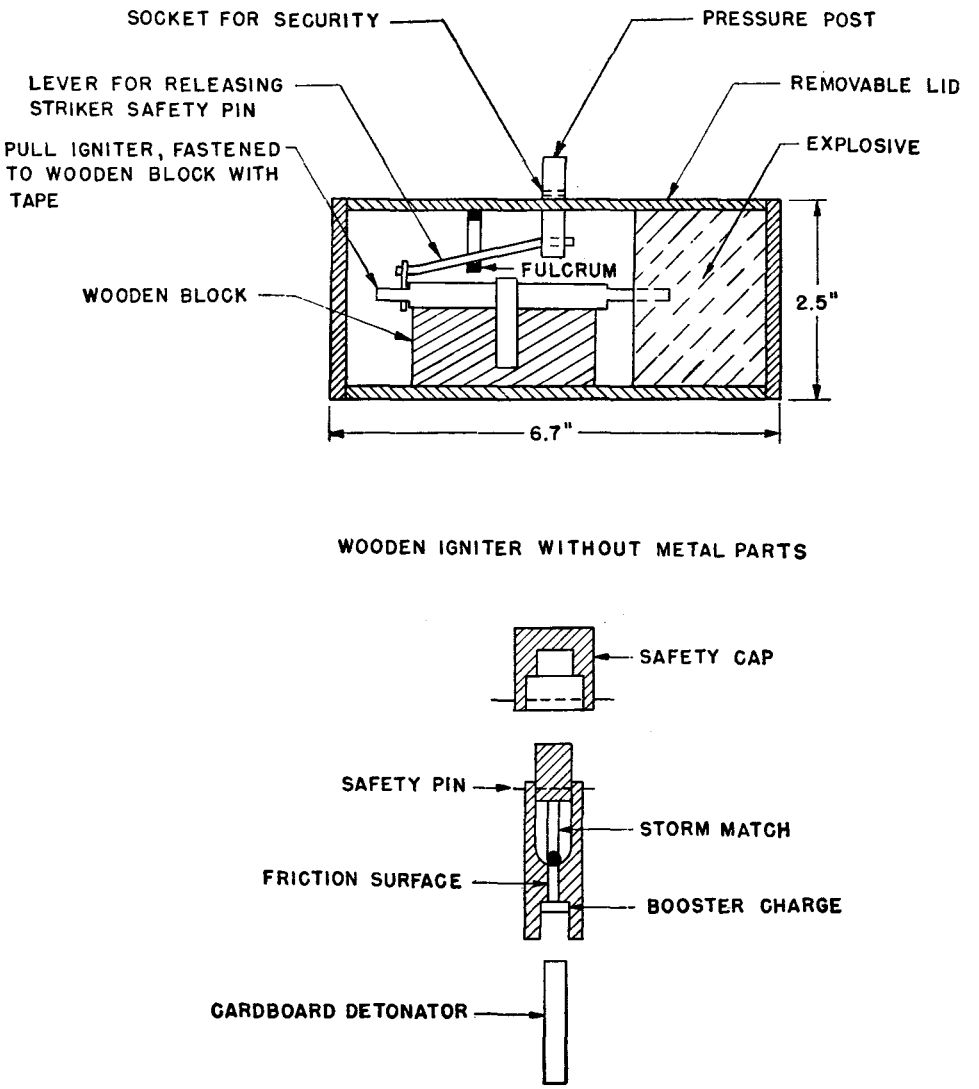


Figure 176. Cross section of antipersonnel wooden box mine.

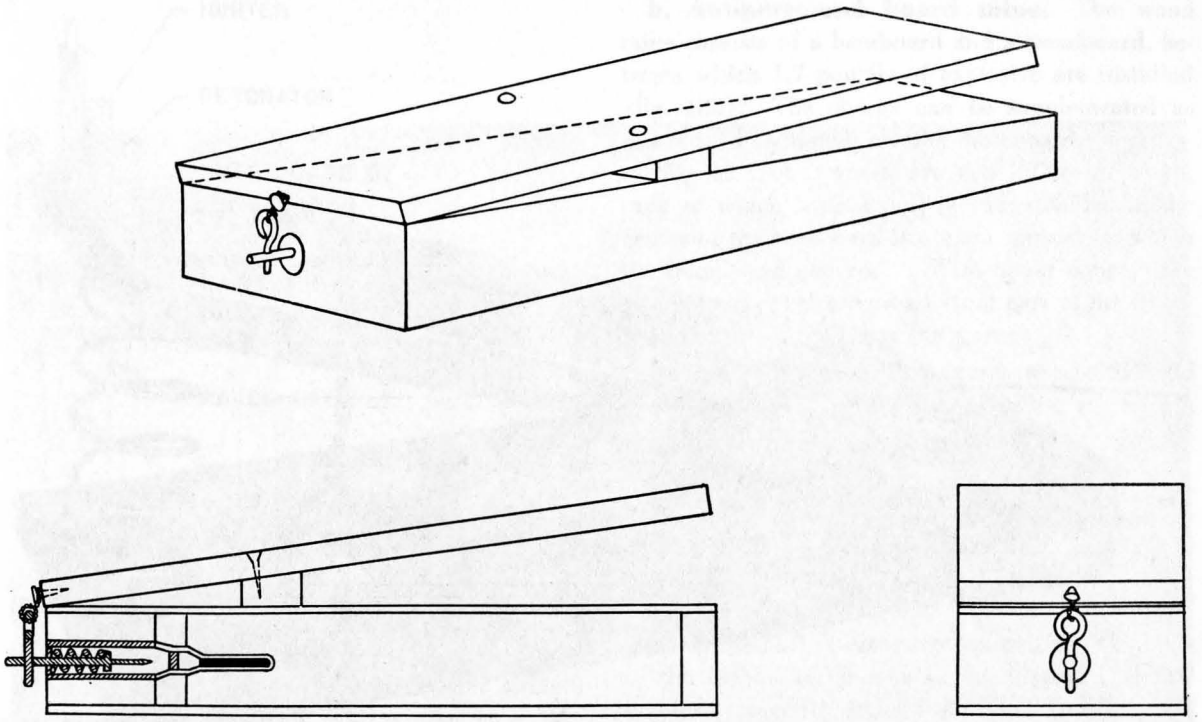


Figure 177. Tread mine with fulcrum.

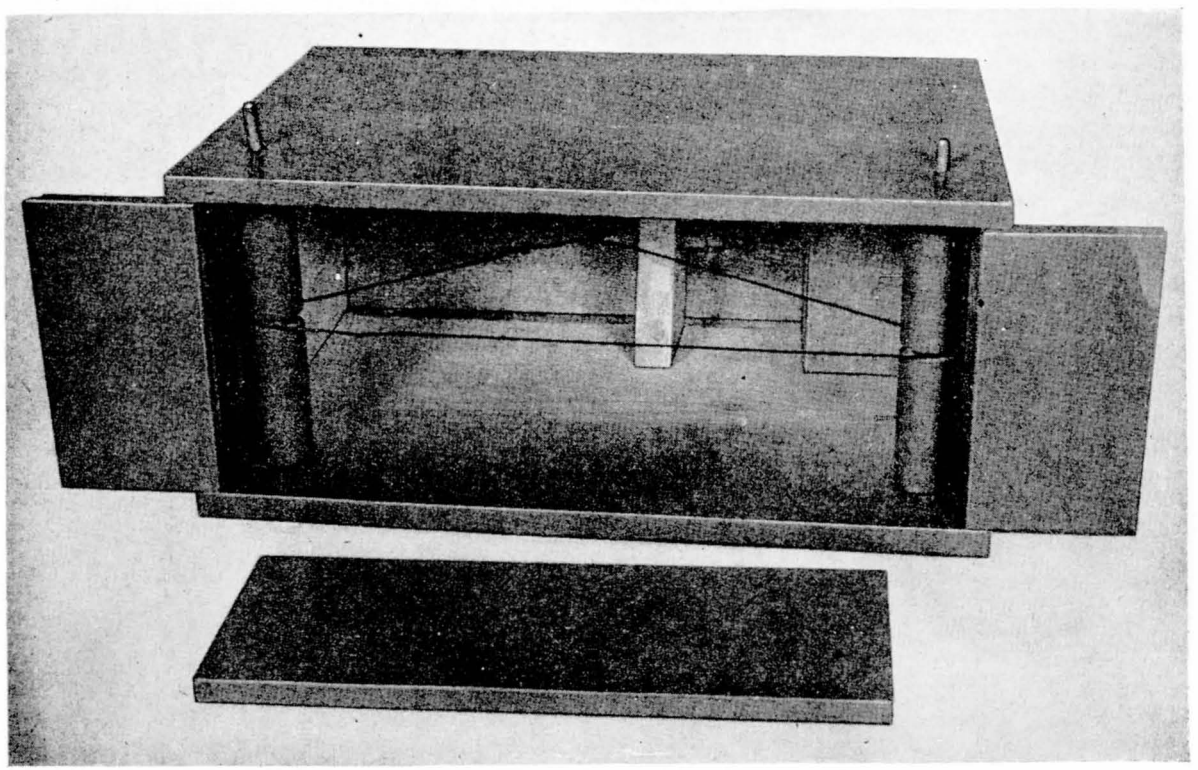


Figure 178. Tread mine with rollers.

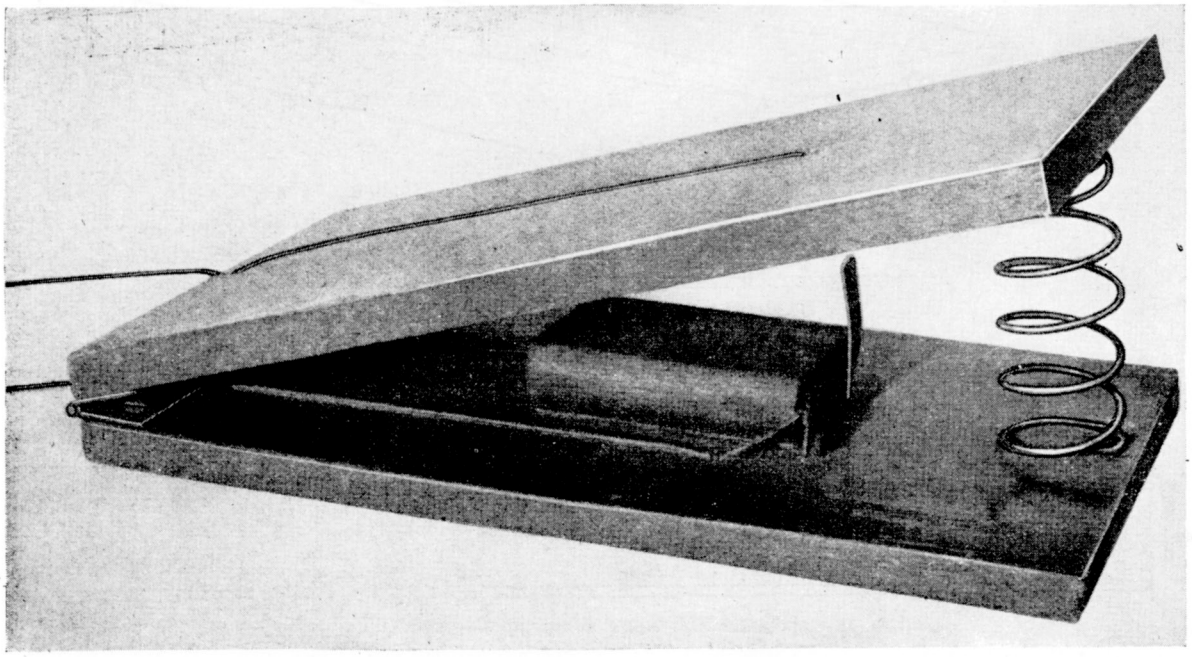


Figure 179. Electrical contact for tread mine.

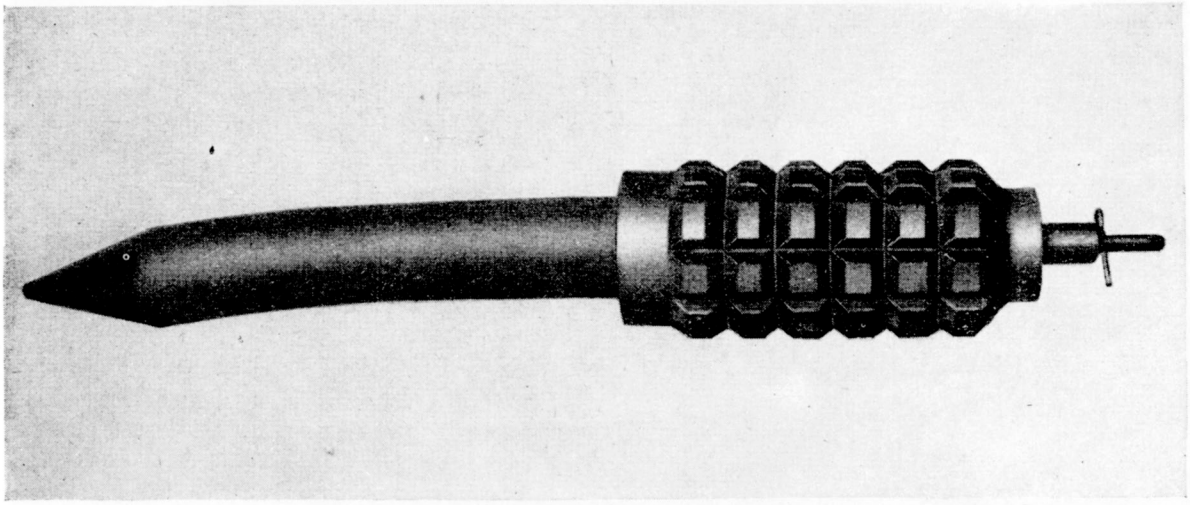


Figure 180. POMZ–2 antipersonnel stake mine.

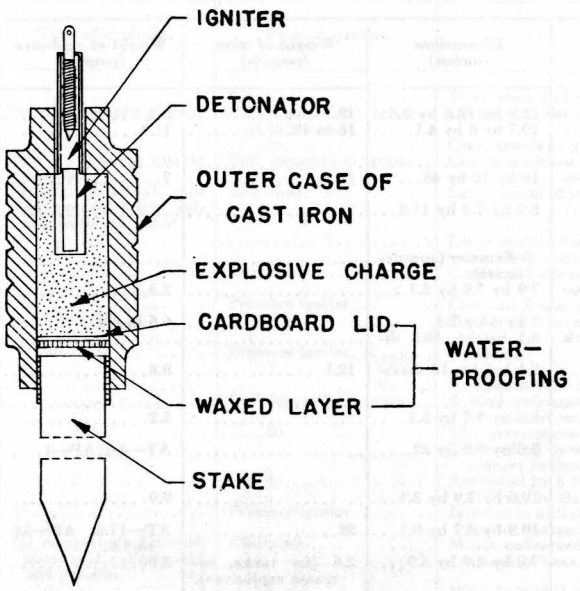


Figure 181. Cross section of POMZ–2 antipersonnel stake mine.

The trip wire is attached to the igniter striker release pin by a snap-hook with a wire loop. A second stake, having the same dimensions as the anchor stake, is provided. The free end of the trip wire is attached to it. A notch is provided near the top of the second stake to facilitate fastening.

CHARACTERISTICS

Diameter	2.3 inches.
Height	7.1 inches.
Weight (total)	4.4 pounds.
Weight (explosive)	2.6 ounces.
Type of explosive	Toluol.

h. Antipersonnel board mine. The wood mine consists of a baseboard and a treadboard, between which 1.7 pounds of explosive are installed (fig. 182). The charge can be supplemented as desired. Positioned on the baseboard, approximately 12 inches apart, are two blocks of wood, each of which seats a pull igniter. Nailed in the center of the baseboard is a fixed support on which the treadboard can rock. Wire hooks connect the igniter striker release pins to that part of the treadboard immediately above the igniters.

Because of the lever action, pressure on either end of the treadboard will cause the striker release pin to be withdrawn from the opposite end.

CHARACTERISTICS

Dimensions	23.6 by 3.9 inches.
Height	4 inches.
Weight (explosive)	1.7 pounds.

i. OSM–152 fragmentation mine. The body of the OSM–152 consists of an adapted 152-mm. artillery projectile, which is launched from an ejection cup and which bursts when approximately 1½ feet above the ground (fig. 184).

The nose of the projectile is closed with a threaded plug, to which a hook is attached. A booster charge and an igniter (MB–II) is housed in the rear of the projectile. The booster is not placed in position until the mine is laid.

The ejection cup contains a black powder propelling charge, electric detonator, and an approximately 40-inch length of wire cable. One end of

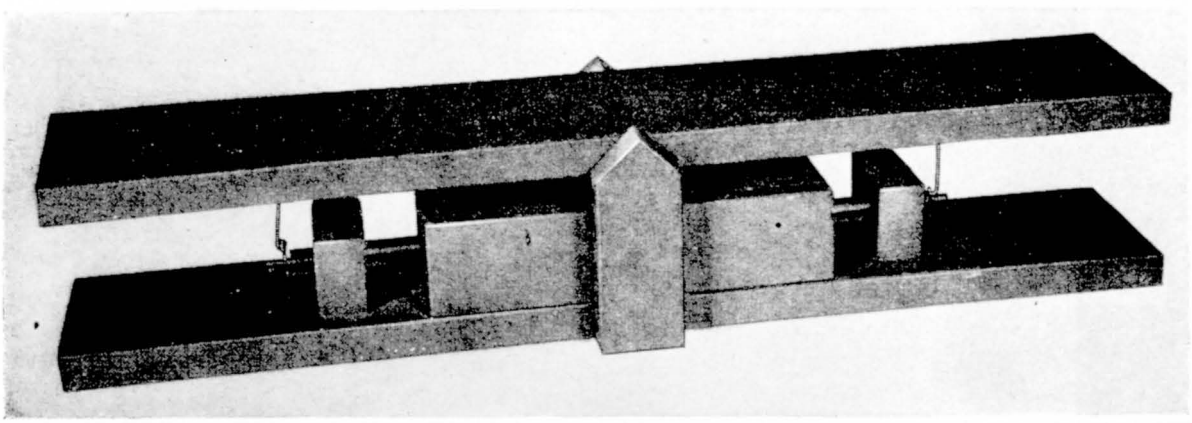


Figure 182. Antipersonnel board mine.

Designation	Type	Description	Dimensions (inches)	Weight of mine (pounds)	Weight of explosive (pounds)
EZ AT Mine	AT	Square metal box	12.6 by 12.6 by 2.3	12.1	2.2
Wooden AT Mine	AT	Rectangular plywood box	19.7 by 6 by 4.1	16 to 18	11.4
Pressure Mine	AT				
Asbestos Mine	AT	A square asbestos case painted camouflage color.	10 by 10 by 48	12.5	7
Magnetic Mine	AT	Bronze box	3.9 by 7.9 by 11.8		
BMS–1 Magnetic Mine	AT	Spherical sheet steel	10 diameter (approximate).		
Electrical Mine	AT	A square plywood box painted camouflage color.	7.9 by 7.9 by 3.1		3.3
Horseshoe Mine	AT	Horseshoe-shaped metal	4 by 4 by 7.4		6.6 to 8.8
AT Mine TBM–2	AT	A round cardboard case painted black to brownish black.	6.1 height, 10.8 diameter.		
AT Mine TM–41	AT	Round metal case	5.1 height, 10 diameter.	12.1	8.8
Box Mine	AT	Square wood box			
Outrigger Mine	AT	Approximately a wooden cube	6.8 by 5.7 by 5.1		5.2
Ovchinnikou AT Mine	AT–AP	Rectangular wooden tray with an overlapping wooden lid.	9.5 by 8.9 by 22		AT—4.4; AP—1
Lever Mine	AT–AP	Rectangular wooden box	19.6 by 7.9 by 3.1		9.9
VMG Mine	AT–AP	do	18.9 by 4.7 by 9.1	22	AT—17.6; AP—6.6 to 8.8.
1941 Infantry Mine with Electrical Ignition.	AP	Rectangular bundle	7.8 by 3.9 by 3.9	2.6 (for tanks, increase explosives).	2.6
Bounding Mine	AP	Metal cylinder	11 height, 5.1 diameter.	17.6 (8.8 shrapnel)	2.6
Infantry AP Portable Mine	AP	Wood veneer or sheet metal	5.5 by 1.9 by 1.1		
Iron Box AP Mine	AP	Rectangular sheet iron container	2.3 by 4.7 by 2.3		1.4
Vise Mine	AP	Flat, round sheet metal container	2.5 height, 11.8 diameter.		1—Toluol; 1.4—Grisute.
Electrochemical Pressure Mine.	AP	Rectangular plywood chest	5.1 by 3.9 by 1.2		0.5
Electrical Pressure Mine	AP				
Metallic AP Mine PMM–5 (Ski Mine).	AP	Metal container			0.5
Beerstein Mine	AP	Cylindrical cast iron unit	11.8 height, 5.9 diameter.	44	
MZ Mine	AP	Cylindrical steel container	9.8 height, 5.1 diameter.	22.4	3.9
Ampoule Mine	AP	Rectangular wooden box	6.7 by 4.4 by 2.3		2.2
Infantry Mine PMM–3	AP	Round sheet iron container			
Magnetic Mine 158	AP	Bakelite trough box	5.7 by 2.7 by 1.5		1

Figure 183. Secondary

Type of explosive	Type of ignition	Remarks
.....	Electrical.....	Fires when 2 of its 4 contacts are short circuited.
Toluol or melinite blocks..	Pull (simplified) igniter at each end.	Slightly heavier but similar in construction to TMD-1940 AT mine.
.....	.....do.....	Corresponds in general design, weight, and effect to the wooden AT mine.
Gray ammonium nitrate powder.	Pull (simplified) igniter..	Contains almost no metallic parts. Very difficult to detect.
Trotyl, ammonal, and compressed bright yellow sulfur ointment.	Electrical.....	Large metal objects attract the magnet and close the contacts.
.....	.....	Large metal objects attract the magnet and mine adhers to object. Explodes after approximately 6 hours.
.....	Electrical.....	Contains 3 circuits, each of which can be interrupted separately.
.....	Pressure igniter.....	Contains 2 igniters and usually is employed with a supplementary charge.
Amatol 80/20.....	.....	Similar to Asphalt-Cardboard Mine. Dimensions are slightly smaller.
.....do.....	Pressure igniter.....	
.....	.....	No information on dimensions, weights, and igniters available.
.....	Pull (simplified) igniter..	A steel outrigger, on each side which is fastened by 2 stirrups which reach about 20 inches beyond the mine.
.....	.....do.....	The overlapping lid is supported by 4 wooden shear pins, which may be varied in strength according to tactical requirements. A variation is believed to exist which employs a metal plunger in lieu of the wooden one.
.....	.....do.....	Activated by a 10-inch lever, which is supported over the mine by a block of wood and fastened at 1 end to the rims of the safety pin.
.....	Pressure igniter.....	Ignition is initiated through a wooden pressure bolt, in turn through an immediate bolt of the igniter charge and then the striker of the main charge.
Tol compound of toluol, nitric acid, sulfuric acid, and paraffin.	Electrical.....	Mines connected by wires with switchboard, from which they are exploded in sequence by means of keys.
.....	.....do.....	Mine is hurled up and explodes about 40 inches above the ground. Effective radius about 150 feet.
.....	Pull igniter.....	Mine divided into 3 compartments.
TNT.....	Pressure igniter.....	Igniter head protrudes about 1 inch above lid of box.
Tuluol and grisute.....	Pull igniter.....	Container lays between 2 wooden legs, which are connected by a hinge. Pressure on upper leg forces a metal slide down, which pulls out the safety pin.
.....	Electrical, chemical and pressure release.	Mine provided with an electrical contact, a chemical pressure contact, and a pressure release contact.
.....	Electrical.....	Ignition devise consists of 2 small boards, kept apart by spiral springs and furnished with contact plates on the inside.
.....	Pressure.....	Used against skiers. Container is fitted with an angle iron brace and a U-shaped pressure stirrup.
.....	Pull or electrical.....	By use of a pull igniter in the top of the mine, it can be employed as a trip-wire mine.
Trotyl.....	Pressure igniter.....	Can also be installed as a trip-wire mine by passing a trip wire through eye of the shear rod.
.....	Chemical.....	The box is closed by a hinged lid, in the middle of which is a hole for inserting the ampoule. Also is used for rail blasting.
.....	Pressure.....	
Trotyl.....	Delayed action mechanical time fuze.	

Soviet mines

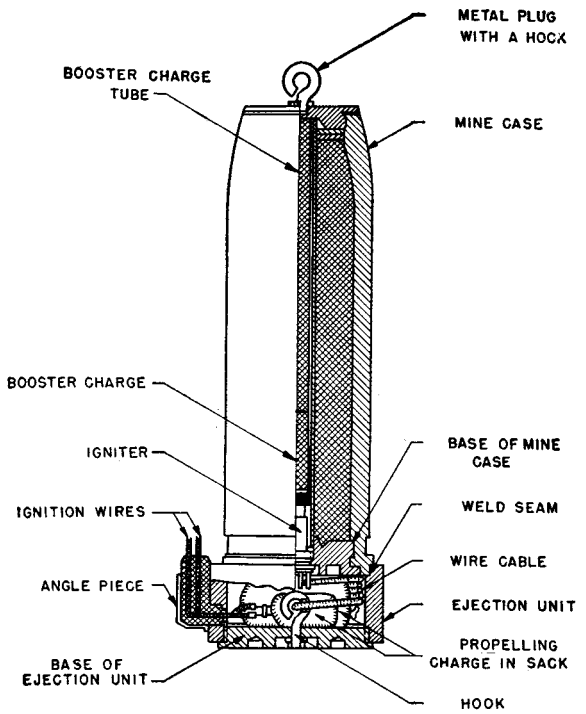


Figure 184. Cross section of OSM–152 fragmentation mine.

the cable is attached to the trigger of the igniter, and the other end to a hook situated in the base of the ejection cup. Ignition wires, connected to the electric detonator pass through the sides of the ejection cup by means of a metal angle piece. The circuit can be closed either by a remote control, manually-operated switch or by various types of pull or pressure switches.

When the detonator is exploded, the propelling charge expels the projectile from the ejection cup. The wire cable, when fully extended, withdraws the trigger axle from the igniter allowing the striker to fly forward and detonate the projectile.

The 122-millimeter howitzer projectile also may be used. It has the following characteristics:

CHARACTERISTICS

Height	19.6 inches.
Diameter	5.1 inches.
Weight (total)	88.1 pounds.
Weight (explosive)	13.8 pounds.

The fragmentation mine 300 is a projectile-shaped steel cylinder, 11.8 inches in diameter and 39.2 inches high. It weighs 132 pounds. Similar in appearance and in operation to the OSM–152, it utilizes an electrical igniter.

4. MISCELLANEOUS AND IMPROVISED MINES

Reports indicate that the Soviets are adept at utilizing local materials and improvising. For characteristics of some improvised mines and deviations from standard models see figure 184.

In addition to those shown in figure 183, the following improvisations or expedients have been used:

Antitank mines:
- PRM rolling beam mine.
- Non-metallic mine.
- Artillery shell mines (with pull or pressure igniters).
- Rod mines (corresponds to trench "mine antichar").
- Galitski mine (rocket mine somewhat similar to Soviet LMG rocket mine).
- DM highway mine (uses vibration igniter).

Antipersonnel mines:
- Barrel mine.
- Pot mine.
- 3-decker mine.
- Hand grenade.
- Stone catapault.
- Tuning fork mine.
- Wooden mines with chemical igniter (similar to ampoule mine).
- Steel pipe mine.
- Pressure board mine.
- Tension wire mine with electrical clockwork igniter.
- Wood chest mine with clockwork vibrator igniter.

5. BOOBY TRAPS

The Red Army has made extensive use of many antitank and antipersonnel mines as booby traps. In addition, many improvisations and field expedients have been employed. Use has been made also of time-delay ignition devices, vibration igniters, and antilifting devices. Sites most frequently used for booby-trapping are cross roads, assembly areas, river crossing sites, buildings, headquarters areas, areas in and around minefields, and all types of abandoned or destroyed equipment. The following are a few of the types of booby traps used by the Red Army during World War II.

Boxes of German 7.9-mm. ammunition were found to contain cartridges in which high explosive and detonators had been substituted for the normal propellant. Such boxes were dispersed among other boxes containing good ammunition. The booby trapped ammunition would destroy rifles or machine guns in which it was used.

German bandage packets wrapped in brown paper contained shrapnel and detonators.

Booby traps were disguised as Red Cross bandage cases.

Silver-gray, light metal flasks, such as those issued to German troops in summer, contained explosive charges and detonators, which exploded when the lids were opened.

Imitation frogs, camouflage colored, would detonate upon pressure.

Cognac bottles, red flags, flashlights, and letter envelopes have been found to contain high explosives. Other objects used as booby traps have been mechanical pencils, watches, cigarette cases and lighters, and salt shakers.

Section II. IGNITERS AND DETONATORS

1. GENERAL

The pressure igniters used by the Soviets generally are similar in construction and in operation to the German pressure igniters *S. Mi. Z. 35 or D. Z. 35.* However, most Soviet mines utilize the pull (simplified) igniter. Like their mines and most other equipment, Soviet igniters are of simple construction. The Red Army also employs percussion, friction, chemical reaction, and electrical igniters. In addition, the Red Army has clockwork igniters with delay ranging from minutes to 60 to 120 days.

2. IGNITERS

a. YB pull (simplified) igniter. Reports indicate that this is the most frequently used Soviet igniter for detonating mines and explosive charges.

It consists of the igniter case (1) with cap (2), bushing (3), striker spring (4), and the cap holder (5). The percussion cap (6) and the detonator (7) are inserted when preparing the igniter for use (fig. 185).

To arm the igniter, the striker bolt is withdrawn by the handle (9) and the striker release or safety pin (10) is inserted in the hole in the striker bolt. The handle then is removed from the striker bolt. The cap holder is unscrewed, the detonating cap is positioned in its recess (8), and the cap holder is replaced. The detonator is inserted in the bore

of the cap holder. Withdrawal of the striker release or safety pin releases the striker bolt, which is forced against the percussion cap by the striker spring.

The igniter weighs 5.2 ounces, and is 9.1 inches long and 0.5 inch in diameter.

An improved pull (simplified) igniter, MYB, is reported. Apparently, it can be used under water.

b. MV–II igniter. The MV–II (fig. 186) is employed in the antipersonnel fragmentation mine OSM–152. It consists of a steel cylinder case (1),

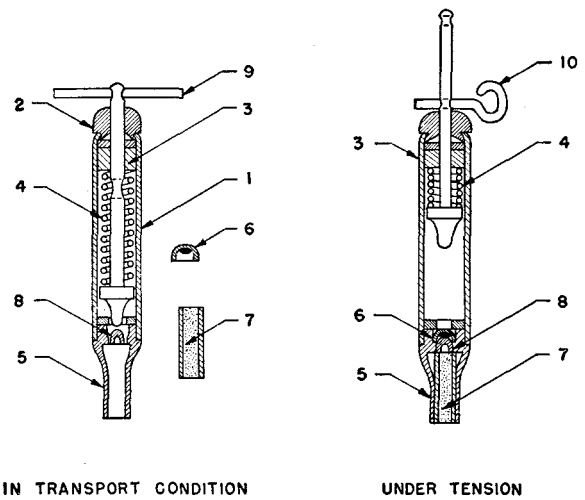


Figure 185. Cross section of YB pull (simplified) igniter.

striker bolt (2), striker point (3), striker spring (4), safety retention ball (5), trigger axle (6), wedge (7), detonator (8), and detonator holder (9).

The igniter is activated when the slack in the cable, which is attached to the hook of the mine base and the eye of the trigger axle, is taken up, thus shearing the wedge and withdrawing the trigger axle. The retention balls, under pressure of the striker spring, move away from the neck of the striker bolt. The released bolt strikes the detonator, which explodes the booster charge and the mine.

c. Pressure igniter for PMZ–1940 antitank mine. This and the MV–II igniter are somewhat similar in that both have striker retaining balls, which must be released before the striker can move forward. It functions similarly to the German *S. Mi. Z. 35* or *D. Z. 35.*

The igniter (figs. 187 and 188) consists of an aluminum alloy bell-shaped hood, a cylindrical sheet metal container, a sheet metal transit cap, a square pressure stud, a striker spring, striker retaining balls, a striker, a percussion cap, a detonator, and a booster.

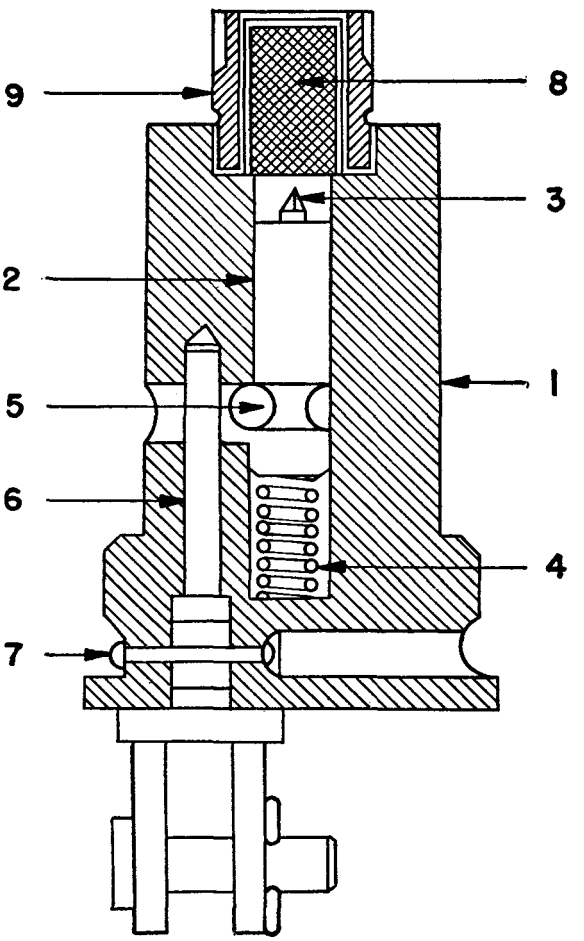


Figure 186. Cross section of MV–II igniter.

After the transit cap is removed the igniter is positioned in the mine, and it is armed and cannot be adjusted.

Approximately 50 pounds pressure will force the striker housing downward, allowing the striker retaining balls to fall into the side recesses. The striker spring then forces the striker against the percussion cap, firing the cap, and exploding the detonator and the booster.

There is no safety other than the transit cap.

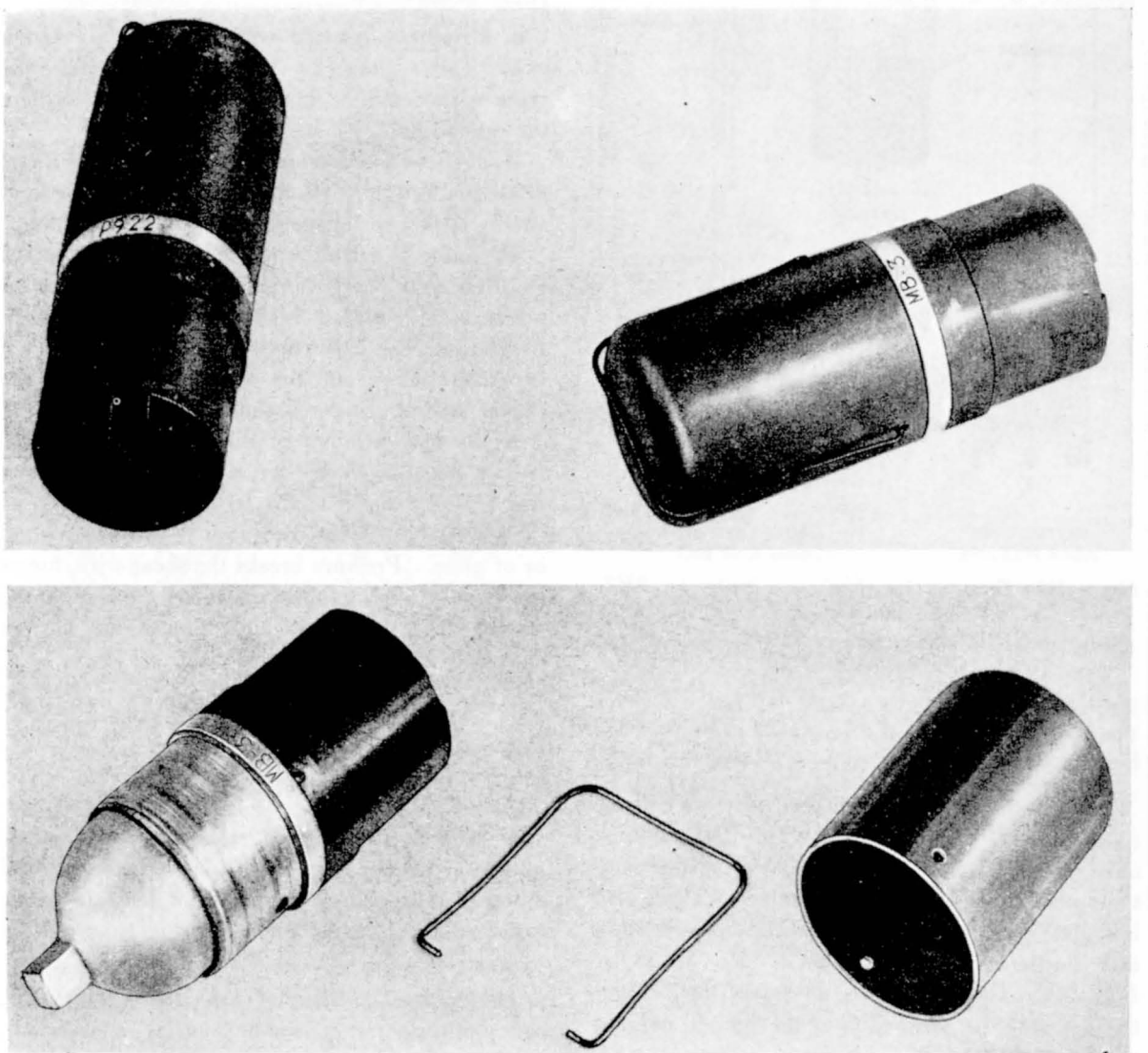


Figure 187. Pressure igniter for PMZ–1940 antitank mine.

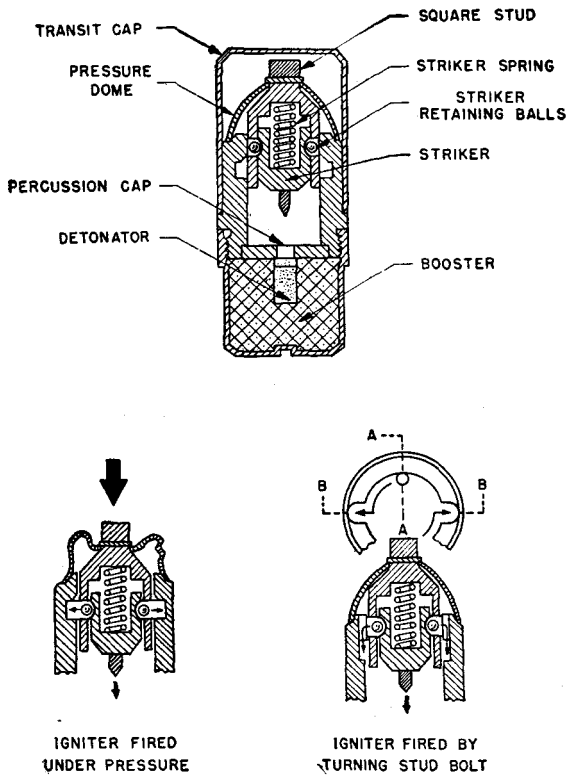


Figure 188. Cross section of pressure igniter for PMZ-1940 antitank mine.

CHARACTERISTICS

Height---------- 3.9 inches.
Diameter---------- 1.1 inches.
Firing pressure (approximate)------ 50 pounds.

d. MV–5 pressure igniter. The MV–5 igniter (fig. 189) is used in the TM–1941 antitank mine, the TMB–2 antitank mine, the TMD–B antitank mine and in various other mines. There also is a plastic model, known as the MV–5K. It operates similarly to the German *S. Mi. Z. 35* or *D. Z. 35*. The igniter has no safety device, and the detonator is screwed into the igniter only at the place of use.

The igniter consists of the body (1), striker (2), telescoping pressure hood (3), striker spring (4), striker retaining ball (5), and a MD–2 detonator (6).

Force exerted on the mine causes the pressure hood to telescope down the body. When the hemispherical indentation is opposite the striker retaining ball, the ball falls into the dent. This frees the striker bolt. The striker is driven against the percussion cap and explodes the detonator and the mine.

CHARACTERISTICS

Height---------- 3.6 inches.
Firing pressure---------- 22 to 44 pounds.

e. Pressure igniter with wooden pressure cap. This igniter (fig. 190) is used to ignite all types of improvised mines. It can be secured by the safety pin.

It consists of an overlapping wooden pressure cap, safety pin, two shear wires, metallic case, striker bolt, striker, striker spring, percussion cap, and detonator.

The mine is armed when the igniter is inserted and the safety pin is withdrawn. The wooden pressure cap rests on the head of the striker bolt. Pressure on the cap telescopes the cap, shears the two shear wires, and the striker spring hurls the striker against the percussion cap.

A wooden variation of this igniter is reported. It uses only one shear wire, a cardboard detonator, and a storm match and a friction tube instead of the striker bolt. The pressure cap can be of wood or of glass. Pressure breaks the shear wire, forces the friction tube against the match, and fires the match. The match, in turn, ignites the booster charge in the cardboard detonator.

CHARACTERISTICS

Length (with detonator) (approximate)-- 2.1 inches.
Diameter of wooden pressure cap (ap- 1 inch.
proximate).

f. VPF igniter (field mine igniter). This all-season igniter (fig. 191) is used in improvised mines of all types, on land or in water. It can be activated by a lateral pressure or pull, as well as by axial pull.

The igniter consists of the clamp with ring, safety pin, holder, striker bolt spring, striker bolt, striker, hinged head, percussion cap, and detonator. The detonator is waterproofed at the joints with lacquer. The holder is soldered to the striker housing and is used to fasten the igniter to the explosive charge. The clamp, a small tubular section with flexible prongs, firmly holds the striker bolt to the hinged head.

The igniter generally is assembled only at the site of use. The striker bolt is forced upward

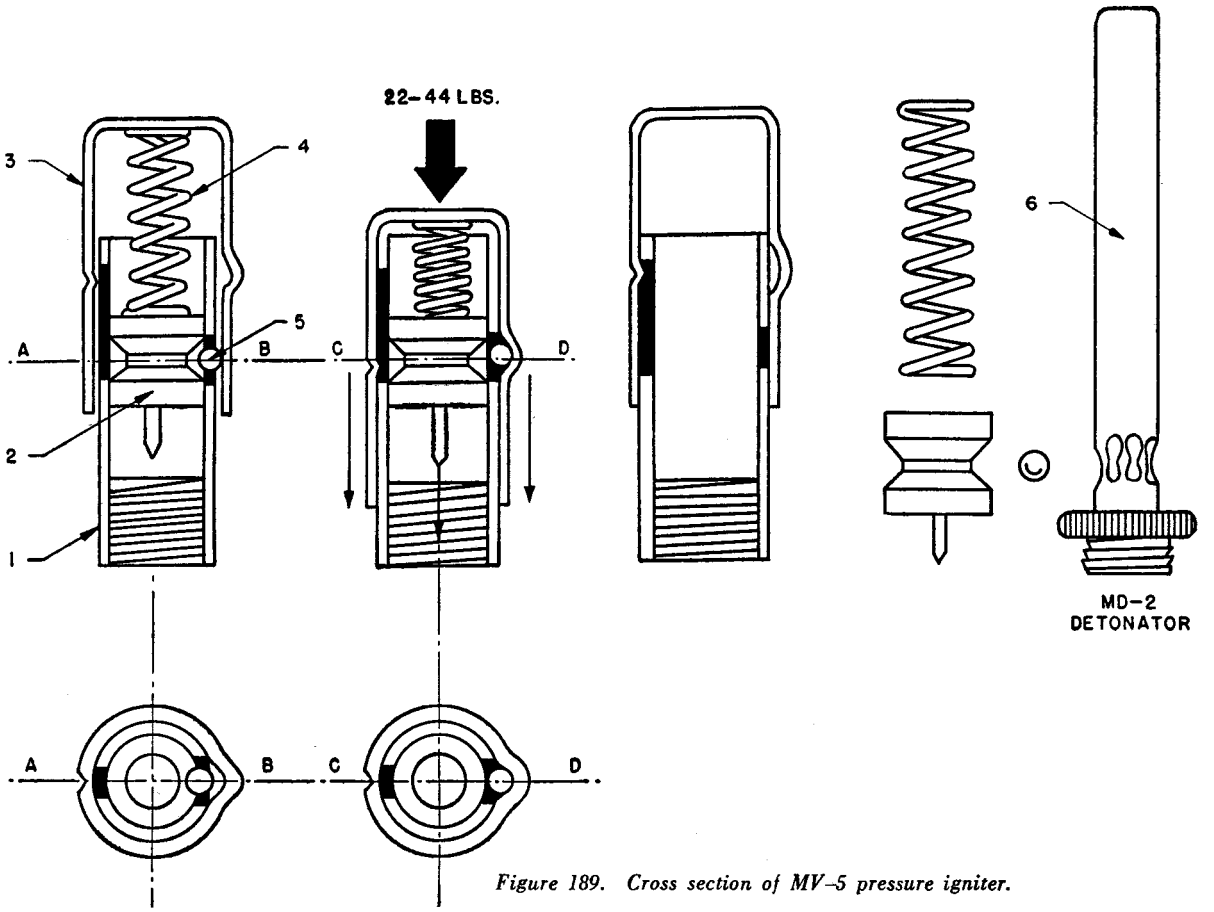
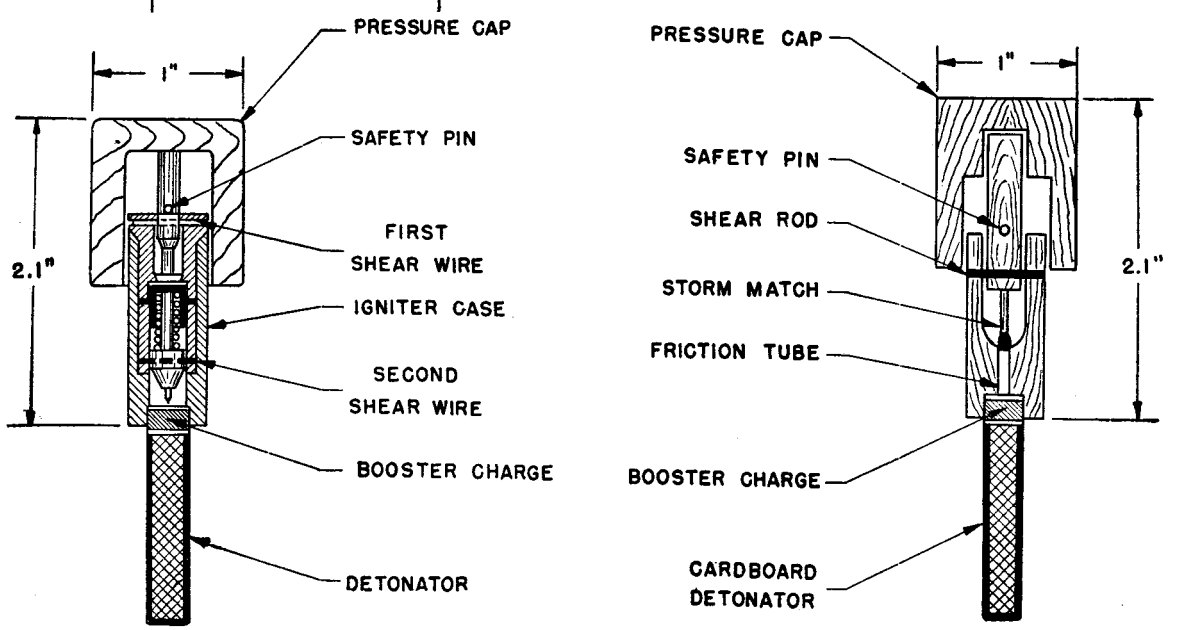
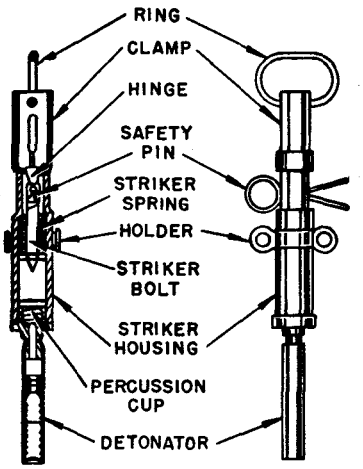


Figure 189. Cross section of MV–5 pressure igniter.

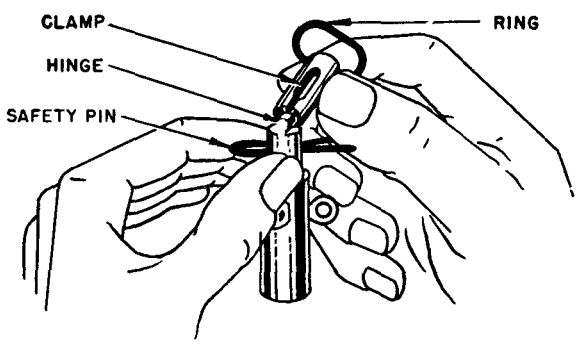


WOODEN PRESSURE IGNITER NON-METALLIC PRESSURE IGNITER

Figure 190. Cross section of pressure igniter with wooden pressure cap.



VPF FIELD MINE IGNITER



MOUNTING THE CLAMP OF THE VPF IGNITER

Figure 191. VPF field mine igniter.

until resistance is felt. Then, the clamp is forced on to the hinged head of the striker bolt. The clamp holds the striker in a position of tension. An MD–2 detonator is screwed into the igniter.

When the igniter is installed underwater, the safety pin is withdrawn before the charge is placed in the water. To secure the igniter for a short period after the safety pin is removed, a small lump of sugar or other soluble substance is inserted between the striker and the percussion cap. The detonator is unscrewed one-half turn to allow water to penetrate and dissolve the substance.

The igniter can be adjusted so that the flexible prongs yield sideways and release the striker bolt when the clamp is moved from its position on the hinged head of the striker bolt in such a manner that the flexible prongs are lifted out of the striker housing. A lateral pressure or pull of from 2.2 to 3.3 pounds or an axial pull of from 8.8 to 14.3 pounds is required.

The igniter can be secured, under favorable conditions, by inserting a wire or a pin in the safety pin hole.

CHARACTERISTICS

Firing pressure:
Lateral pressure or pull..... 2.2 to 3.3 pounds.
Axial pull..... 8.8 to 14.3 pounds.

g. PV–1942 rod igniter. The PV–1942 (fig. 192) is a mechanical pressure igniter with a replaceable pressure rod. It is used principally for firing railroad mines, but it can be installed in all kinds of charges.

The box and lid are of 0.03-inch sheet iron. A pressure rod is screwed into the lid. The hinged lid rests freely on a trigger stirrup. The trigger stirrup supports the lid and also holds the striker under tension by means of a crosspiece.

The square striker case lies on the floor in the middle of the outer case and is fastened at one end by the case screw. The striker passes through a hole at the opposite end of the ignition case and is

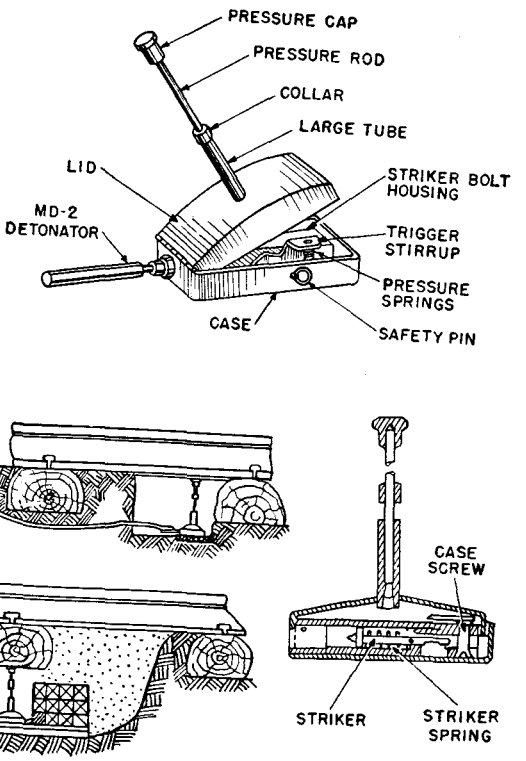


Figure 192. PV–1942 rod igniter.

threaded for screwing in a MD–2 detonator. The case contains the striker and striker spring. The safety pin securing the mechanism passes through two holes in the outer case.

When pressure is exerted, the rod and lid are forced against the stirrup and the pressure spring. The striker is released from the stirrup and is driven forward to fire the detonator. When accurately adjusted, the striker can be released by a slight pressure. Normally, the igniter is assembled at the site of use.

It is reported that during neutralization the camouflage must be removed without exerting pressure, and that any fuze leading from the detonator should be removed. When the detonator has been inserted directly in the charge, the igniter and the detonator must be removed and the detonator unscrewed from the igniter. The striker and spring should be removed by exerting pressure on the pressure rod.

CHARACTERISTICS

Dimensions ..... 2.7 by 1.3 by 0.6 inches.
Height (with pressure rod) .... 3.1 to 3.9 inches.

h. EKhV electrochemical igniter. The EKhV igniter (fig. 193) may be employed in conjunction with remote control or vibration igniters, but generally is used alone for delay action ignition of mines or charges.

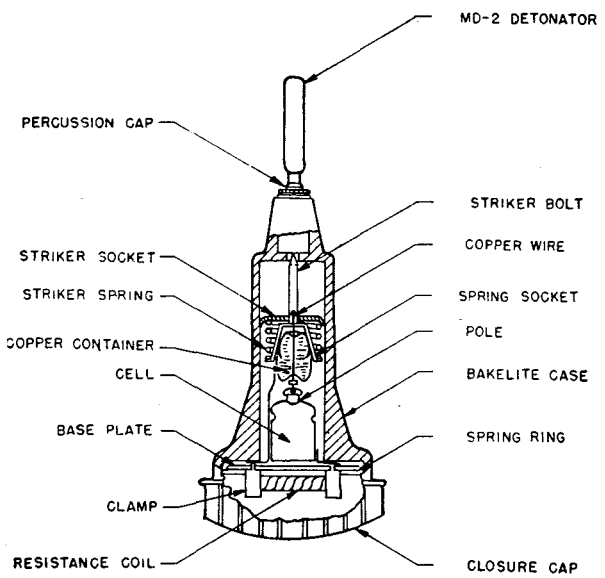


Figure 193. Cross section of EKhV electrochemical igniter.

The igniter consists of a bakelite case closed by a threaded cap. The case contains a striker bolt, striker bolt socket, striker spring, and spring socket. In the recess formed by the striker socket is a copper container filled with a copper sulphate solution, through which passes a bare copper wire. The copper wire is insulated at the points of entry to the container and connects the striker with a 1.4-volt dry cell, which rests on the base plate. Two contact points and a resistance coil are on the base plate.

When the two contact points are connected, the container acts as an anode and the copper wire as a cathode. The copper sulphate solution is the conducting fluid through which the circuit is completed. One of the poles of the dry cell is connected to the copper wire and one of the contact points of the resistor. The other is connected to the copper container and the remaining contact point.

Electrolysis begins when the circuit is completed, destroying the copper wire. This releases the striker, which fires the percussion cap and the MD–2 detonator.

The Soviets state that, although this igniter is activated by a striker hitting the percussion cap, there are igniters in which the striker closes an electrical circuit. Two contact screws are placed in the case so that the striker, when hurled forward, makes contact with both screws and closes the circuit. It is reported that removal of the EKhV should be undertaken only when the igniter has been set for more than 24 hours and not after more than one-half the delay time has elapsed.

CHARACTERISTICS

Height ..... 6.7 inches.
Diameter ..... 2.5 inches.

i. EKhP electrochemical igniter. The functioning of the EKhP is very similar to that of the EKhV igniter. The EKhP has a safety delay of from 10 minutes to 4 hours, dependent on temperature. The igniter is issued in large and small sizes. It consists of a bitumen-coated cardboard container; an electrolyte container; a small enamelled copper wire, a portion of which in approximately the center of the electrolyte container is

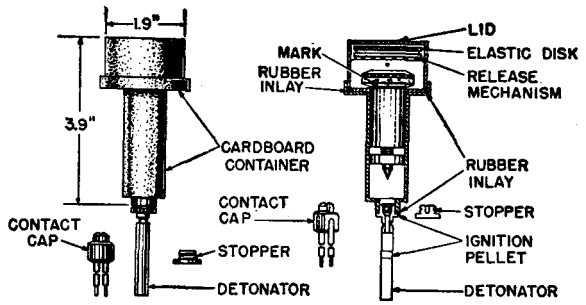


Figure 194. ChMV–10 and –16 clock initers.

not insulated; a copper sulphate solution; a movable contact point; a contact spring; and two fixed contact points.

Current, supplied from an outside source, initiates electrolysis in the electrolyte container. The uninsulated portion of the copper wire is destroyed. Thus, the movable contact point is released and is hurled forward by the contact spring to close the circuit between the two fixed contact points.

CHARACTERISTICS

Dimension	*Large size*	*Small size*
Height	5.1 inches	3.9 inches.
Diameter	1.3 inches	0.7 inch.

j. ChMV–10 10-day clock igniter. The ChMV–10 (figs. 194 through 198) can be used to ignite improvised mines of all types, both on land and in water at any season. It is designed to close automatically a circuit after a predetermined interval of from 2 hours to 10 days. It has an accuracy in setting of 4 hours. There apparently are several variations of this igniter which incorporate minor differences in dimensions, case, or internal arrangement.

The igniter consists of a cylindrical cardboard container, which holds the release mechanism with the clockwork, trigger device, striker, and striker spring. The detonator and contact cap are screwed to the holder support at the place of use.

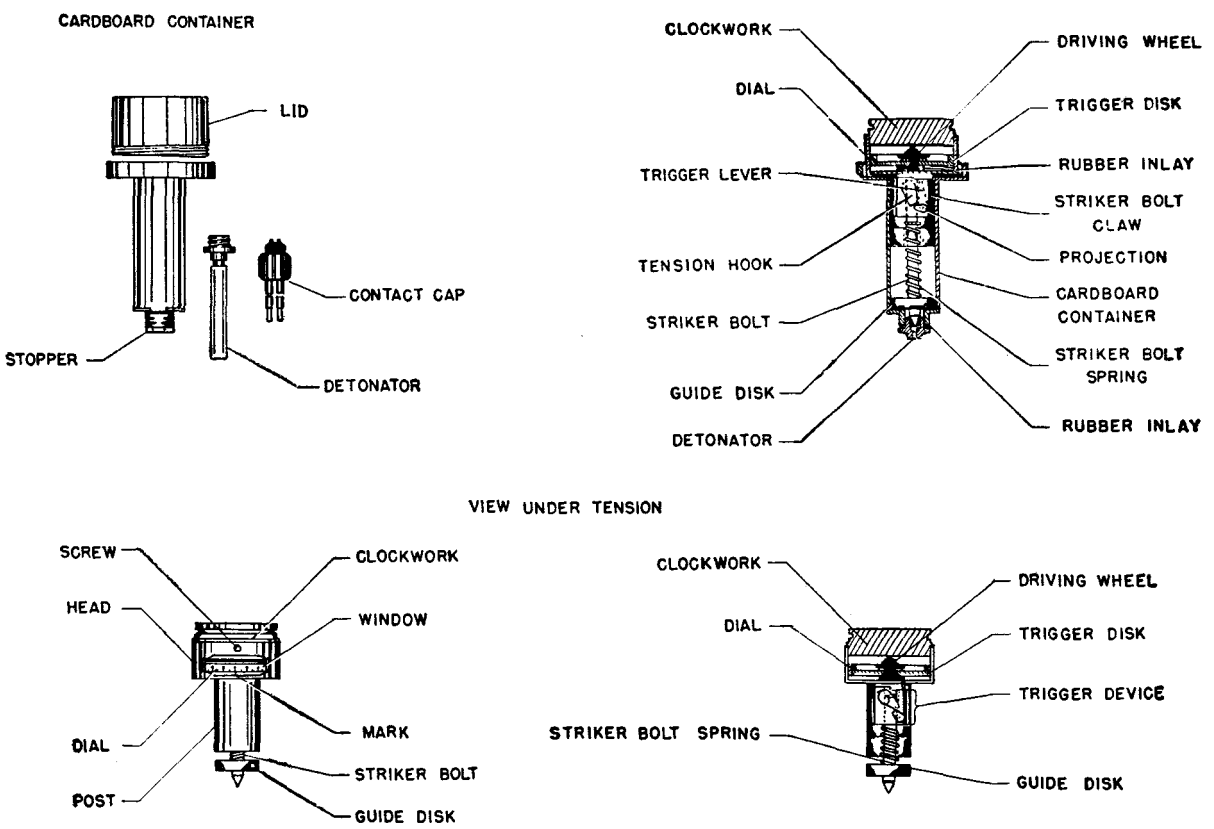


Figure 195. ChMV–10 and –16 clock igniters.

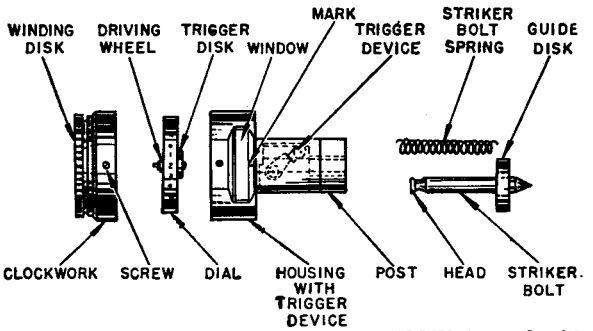


Figure 196. Release mechanism for ChMV–10 and –16 clock igniters.

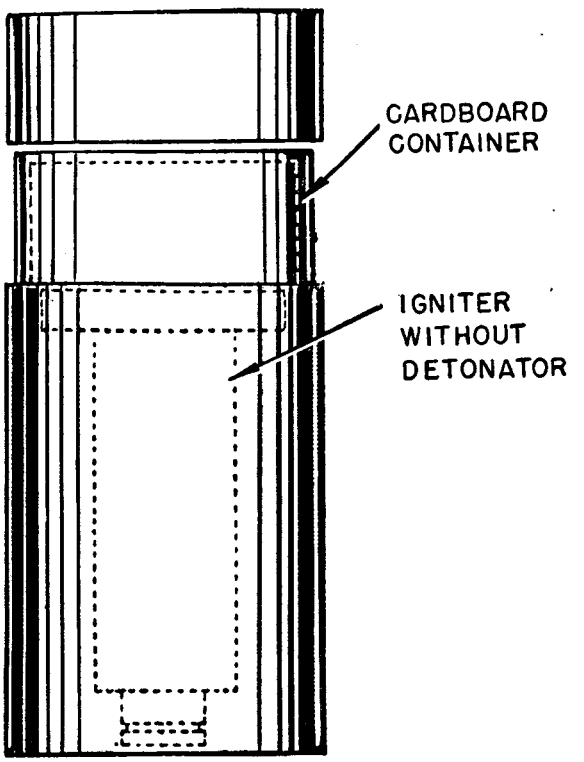


Figure 197. Packing for ChMV–10 and –16 clock igniters.

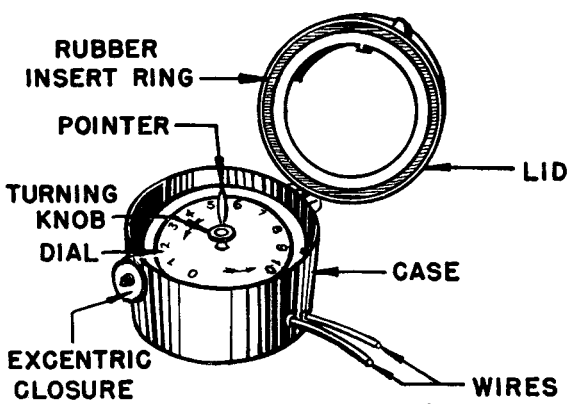


Figure 198. Variation of 10-day clock igniter.

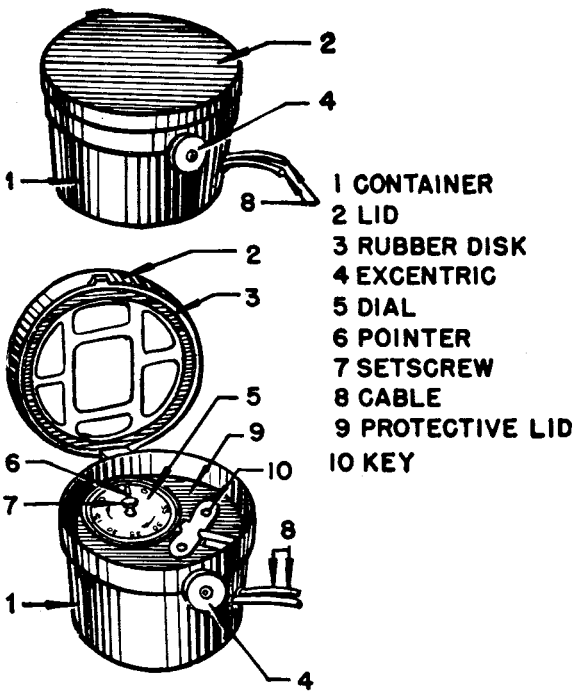
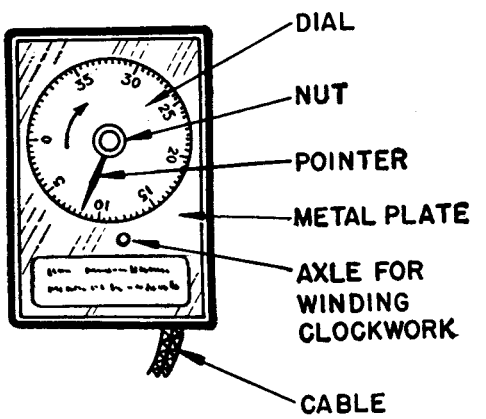


Figure 199. ChMV–35 clock igniter.



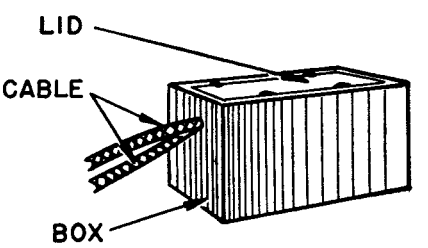


Figure 200. ChMV–35 clock igniter.

The cardboard container is closed by a lid. The lid and the support holder for the detonator are provided with rubber washers to make the container airtight and watertight.

The release mechanism consists of a brass case, clockwork with 10-day graduated dial, trigger device, striker, and striker spring. The clockwork is similar to a pocket watch with a long running time. It is fastened to the head of the case by two screws. A window is cut in the head of the case for the dial. The trigger device, wedged firmly into the shaft of the case, consists of a pivoted trigger lever with a projection on a tension hook and a striker claw. The hook and the claw rotate on the same axis. The trigger lever extends into the head of the case and touches the trigger disc of the dial. The claw holds the striker under tension so long as the lever does not lie in the notch of the trigger disc.

At the end of the predetermined time interval, the trigger lever comes to rest in the notch. This causes the rotation of the trigger lever, the projection, the hook, and the claw. Thus, the striker is released.

Mine detectors are effective against the ChMV–10 when only a thin layer of camouflage is used. Igniters with less than 12 hours running time remaining should be destroyed in place. When more than 12 hours remain, the detonator may be taken out, after which the release mechanism may be removed.

CHARACTERISTICS

Weight	1.1 pounds.
Dimensions:	
Height (without detonator)	3.9 inches.
Maximum diameter	1.9 inches.

k. ChMV–16 16-day clock igniter. The ChMV–16 (figs. 194 through 197) is distinguished from the 10-day igniter only by different graduation of the dial.

l. ChMV–35 35-day clock igniter. The ChMV–35 may have the same housing as the 10- and 16-day igniters (fig. 199), or a rectangular steel box (fig. 200). The igniter closes the circuit after a predetermined interval of from 12 hours to 30 days. It has a setting accuracy of 6 hours.

CHARACTERISTICS

Rectangular box:	
Dimensions	2.7 by 4.4 by 3.3 inches.
Weight	4.4 pounds.
Oval case:	
Length	7.5 inches.
Width	6.5 inches.
Height	3.8 inches.
Weight	7.7 pounds.

m. ChMV–60 60-day clock igniter. This igniter has the same characteristics as the other ChMV series igniters. It can be set for a predetermined interval of from 6 to 60 days, with a possible 10 percent error. It is housed in a watertight metal case and utilizes a MD–2 detonator.

n. VZ–1 vibration igniter. The vibration igniter is issued in a wooden chest, and is contained in a round sheet metal case, painted green. The case is made watertight by asphalt cement. The device is equipped with two trembler switches, arranged at right angles to each other, which respond both to horizontal and to vertical vibrations.

This igniter is installed in conjunction with a delay igniter of the same type. Installation of the two igniters can be accomplished together or separately. It is believed that the igniter responds only to vibratory impulses such as those produced by prime movers, tanks, locomotives, or other large vehicles or moving objects.

3. VIBRATION IGNITER CHESTS

The MZD–1, –2, –3, –4, –5, and –35 chests are known to exist. A chest consists of a wooden box with an integral igniter and charge. It can be used without an additional charge, but generally is installed with a larger charge for the demolition of important installations. The delay can be set for from 2 to 120 days. Various types of camouflaged mine markers are used to indicate the location of these charges. It is reported that the devices always have been buried at a depth greater than 10 inches. Hence, mine detecting equipment always cannot detect them.

a. MZD–1 igniter chest. This wooden chest (fig. 201) contains a charge, an EKhV electrochemical igniter, and a MD–2 detonator. The proper resistance coil is selected at the site of use, and the igniter is adjusted for the desired delay and then is

installed in the chest. In winter, the chest is buried below the frost depth. For use in wet earth, it is waterproofed with tar or paraffin. The chest measures 5.5 by 7.3 by 9.5 inches.

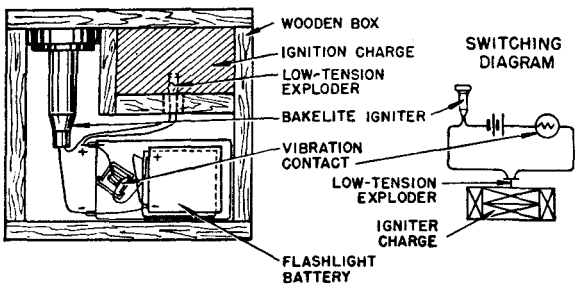


Figure 201. Cross section of MZD–1 igniter chest.

b. MZD–2 igniter chest. The MZD–2 (fig. 202) is similar to the MZD–1. However, it also contains a vibration igniter. The chest is waterproofed and contains the same amount of explosive as the MZD–1. The chest measures 8.6 by 8.2 by 4.5 inches. Its EKhV electrochemical igniter has two contact screws, instead of a detonator. The striker closes the circuit to arm the chest. After the chest is armed, vibration closes the circuit and fires the detonator and the charge.

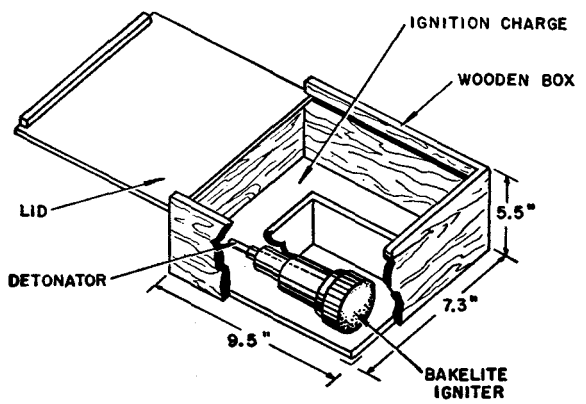


Figure 202. Cross section of MZD–2 igniter chest.

c. MZD–3 igniter chest. Unlike the MZD–2, the vibration contact of the MZD–3 is installed separately from the igniter chest. The chest is buried at a depth of approximately 40 inches, while the vibration contact is buried at a depth of approximately 8 inches.

d. MZD–4 igniter chest. This wooden chest (fig. 203) is somewhat similar to the MZD–2. The delay can be set for up to 120 days. The chest contains an EKhP electrochemical igniter, a dry cell, a VZ–1 vibration igniter, 1 pound of explosive, an electric detonator, and a stirrup frame. The vibration igniter is held on the inside of the cover of the chest by the stirrup frame. The chest measures 7.1 by 5.7 by 4.1 inches.

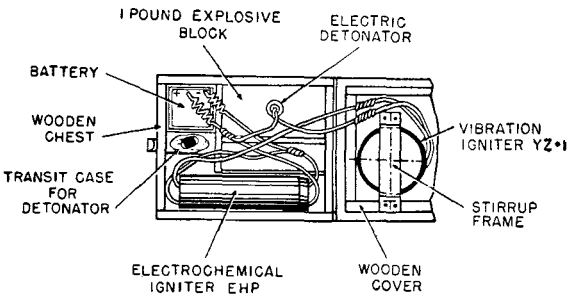


Figure 203. Cross section of MZD–4 igniter chest.

e. MZD–5 igniter chest. The wooden chest MZD–5 is similar to the MZD–4. It uses an EKhV electrochemical igniter instead of the EKhP. Other wise, the size and appearance of the two are exactly identical.

f. MZD–10 and –35 igniter chests. These igniters are almost identical. Each contains a battery, a 10- or a 35-day clockwork igniter and a 60-day clockwork igniter, a VZ–1 vibration igniter, an electric detonator, explosive, a cover, and a handle. The differences rest in the igniter used, the external dimensions of the wooden chest, and the internal division.

The MZD–10 is an 8- by 7.2- by 4.4-inch rectangular wooden chest. It contains a 10-day clockwork igniter enclosed in a 60-day clockwork igniter.

The MZD–35 is a 10.4- by 7.8- by 4.7-inch rectangular wooden chest. It contains a 30-day clockwork igniter enclosed in a 60-day clockwork igniter.

4. RADIO MINE DETONATING DEVICES

a. F–10 radio mine detonating device. The F–10 is essentially a radio receiver which closes the mine firing relay upon the reception of a predetermined radio signal from a transmitter, which may be up to 300 miles away. The device can be set to remain effective for 60 days or longer. It is used to destroy important installations long after their occupation by an enemy. Up to 36 mines can be fired by a single F–10 device.

The igniter consists of receiver, battery, connecting cable, antenna, ignition cables, and waterproof bag. It is contained in a box measuring 15.7 by 14.9 by 11 inches, and weighs 77 pounds. It must be buried at least 10 feet in the ground.

The device is powered by batteries and is equipped with an interrupter and a clockwork device, which shuts off the receiver at regular intervals to conserve the battery. The clock is wound automatically every 3 to 4 minutes. The noise of winding and the ticking of the clockwork mechanism sometimes can be detected by ear.

Three tone signals at definite intervals are used for closing the circuit. Detonation follows the third signal.

The antenna used may be spiral or straight. The spiral antenna is not so efficient as the straight, but requires less space. It is laid in oval pattern around or near the device. Each consecutive spiral is covered with a layer of earth. The straight antenna is up to 100 feet long, and should be buried from 2 to 20 inches underground. It is laid in line toward the transmitter.

When an F–10 is located or suspected, it is necessary, before neutralization, to remove the antenna by cutting as close to the device as is possible. The F–10 normally is enclosed in a rubber container. Care must be taken in removing the device, because it generally is equipped with antiremoval devices and booby traps. When doubt exists regarding unusual booby traps which are not evident, it is advised that the F–10 be removed by means of a long rope or wire.

Name	Type	Characteristics	Main components	Remarks
Kaveshnikov pull igniter.	Pull		Case, hood with brace, hood spring, striker, striker spring, ball stop, hood safety pin, release pin with ring, detonator, and brace.	When release pin is pulled out, the hood spring forces hood up, the ball stop is released. The striker drives forward and causes the explosion.
SDKh chemical delayed-action igniter.	Chemical delayed-action.	Height 5.9 inches, diameter 1.1 inches, weight 1 pound.	Case, striker bolt and spring, collar at base of case used for holding the chemical mixture and small tube containing sulfuric acid, holder, and detonator.	Delay of several days to several months. Delay time determined by concentration of solution and thickness of wire used. Can also be ignited electrically.
Insert tube igniter	Chemical time		Closed glass tube with sulphuric acid. Glass tube with a mixture of "Bertholetsch" salt and sugar.	Sulfuric acid tube is inserted in tube containing salt and sugar. When tube is crushed it ignites a detonating fuze inserted in the opening.
Mercury igniter with delayed action.	Electrical	Height 5 inches (approx), diameter 1 inch (approx), cylindrical case.	Lid, steel case with stopper, contact housing. Case has two compartments, which are connected. Mercury is poured in top compartment and the lower one has a fiber disk which has an opening in the middle which is closed by a zinc wire.	Delay time 1 to 5 days. Case is steel but nickel plated on the outside and varnished on the inside. Mercury decomposes zinc wire and flows into the ebonite shell of the contact housing and closes the circuit.
Contact malkin igniter.	do		Wooden box with a rotating shaft, mercury, and an electrical circuit.	The rotating shaft operates mercury by a cord. The circuit is closed with the shaft moved.
Contact brodzki igniter.	do		Iron box with a steel plate cover, a contact screw, and mercury.	When plate is forced down the contact touches the mercury on the floor of the box and closes the circuit.
Contact tube igniter	do		Cylindrical metal tube with an insulated spring bolt passing through the center and having hooks on each end.	By pulling on the spring bolt, the contact on its end reaches the ring on the tube and closes the circuit.
P–12 railway contact igniter.	do		Explosive charge, electric detonator, dry cell, and the igniter. Igniter is positioned on wooden box with head protruding through hole in cover of box. Igniter contains a telescoping head, head pin, safety pin, electrical contact.	Frequently used in conjunction with chemical or clockwork igniters. Hood on track forces the head down and closes the circuit.
Electromechanical igniter EEM–2 or SEM–2 (33M–2).	do	Firing pressure 17 to 22 pounds.	Wooden supports, wooden pressure bars, wooden spacers, rivets, centerpiece, lug, disk, copper wire contact.	Supports are fitted with 0.8-millimeter copper wire which is laid diagonally so that pressure causes wire to cross. Igniter can be waterproofed by layer of bitumen.
Infernal machine (clockwork igniter).	do	Wooden chest	A wooden chest, clockwork, block of explosive, detonator, dry cell, built in spiral contact.	Vibration of spiral contact closes circuit and causes explosion of charge. Machine operates on same principle as the vibration igniter device and has about same internal set-up.
Improvised clockwork igniter.	Pressure			A pendulum clock is rigged so that the bob falls on pressure igniter of a charge located beneath the clock when it runs out.
Pendulum igniter	Time delay	Rectangular box 8 by 8 by 10 inches (approx); weight 12.1 pounds.		Operating mechanism moves a heavy pendulum. Running time is 30 days or longer.

Figure 204. Miscellaneous igniters.

b. F–40 radio mine detonating device. The F–40 is a technically improved and more sensitive development of the F–10. The battery and receiver units are mounted in cylindrical cases.

The F–40 employs a 1.5-second, three-tone signal followed by a 4.5-second pause. The F–40 can be set for 10-, 30-, or 60-day operation, depending on whether it is operating every 2.5 or every 5 minutes. The antenna is approximately 56 feet long.

c. FTD radio mine detonating device. The FTD is a cheaper production model of the F–40.

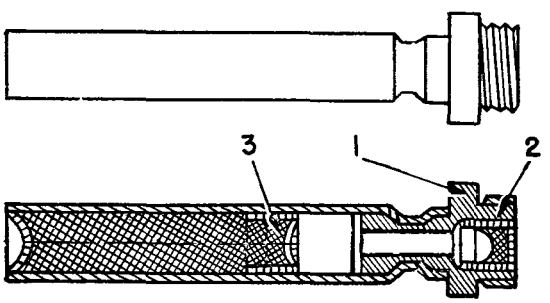
5. OTHER IGNITERS

Miscellaneous igniters (fig. 204) are employed by the Red Army. The igniters generally have the same characteristics as many of those previously described, or are of an expedient or improvised construction.

6. DETONATORS

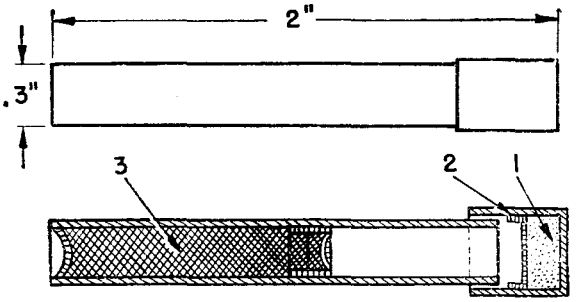
a. MD–2 detonator. The MD–2 (fig. 205) is similar to the United States No. 8 detonator. It has a threaded base, a flanged collar, and a smooth cylindrical body. In the base portion of the detonator is a KV–II percussion cap. Beneath the flange is a small indentation, which extends around the circumference of the tube.

b. MD–4 detonator. The MD–4 (fig. 206) also is similar to the United States No. 8 detonator. It is issued 10 to a wooden box with a sliding top.



1. FLANGE
2. PERCUSSION CAP
3. NO. 8 DETONATOR

Figure 205. MD–2 detonator.



1. PERCUSSION CAP
2. THIN LACQUERED TINFOIL
3. NO. 8 DETONATOR

Figure 206. MD–4 detonator.

It is approximately 2 inches long and 0.3 inch in diameter. A thin lacquered tinfoil partition separates the percussion cap and the detonator. The small end housing the percussion cap is slightly larger in diameter and overlaps the longer tube of the detonator.

Section III. MINE DETECTORS

1. GENERAL

As are most Soviet weapons and equipment, mine detectors generally are of simple design and construction. It is believed that they are not as efficient as American, British, or German detectors. Most models are so constructed that the search coil can be detached from the search rod and attached to a rifle muzzle. Most detectors have a rectangular as well as a circular search coil. The differences between models generally are slight modification in the search coil or power supply.

2. INDIVIDUAL DETECTORS

a. VIM–210. The VIM–210 (figs. 207, 208, and 209) consists of a three-section aluminum search rod with a generator box, a battery case, and a rectangular search coil. A metal tuning box is mounted approximately halfway down the search rod and contains two tubes and the tone regulator. The search coil measures 17.7 by 9.8 inches. Its range depends on the size of the metallic mine. It has considerable sensitivity and efficiency. The detector is capable of continuous use for 24 hours.

Figure 207. VIM–210 mine detector.

The battery box, containing two batteries (60-volt dry cells) and spare tubes, is carried on the shoulder. The plug for the headphones and the heating switch are on the side of the battery case. After the apparatus is assembled, the switch is set at "connected" and the tubes are allowed to heat up for a few seconds. The tone regulator is turned until a tone can be heard in the headphones. When the search frame approaches metal, the tone diminishes.

Searching is accomplished in the same manner as with the SCR–625. A device on the search coil permits fastening to a rifle barrel. Care must be taken that the storage battery stoppers are tightened firmly and wrapped with insulating tape when it is necessary for the operator to crawl or lie down. This will prevent the acid from escaping from the batteries. After use, the apparatus is disassembled and placed back in its wrapping.

Apparently two models of the detector exist. They are known as the 1939 and the 1940 models. The 1939 model weighs 16.8 pounds, and the power supply pack weighs 9.4 pounds. The 1940 model weighs 15.2 pounds, and the power supply pack weighs 11.4 pounds. Another variation appears to be the location of the tuning box. One model has the tuning box on the handle, and one has the box

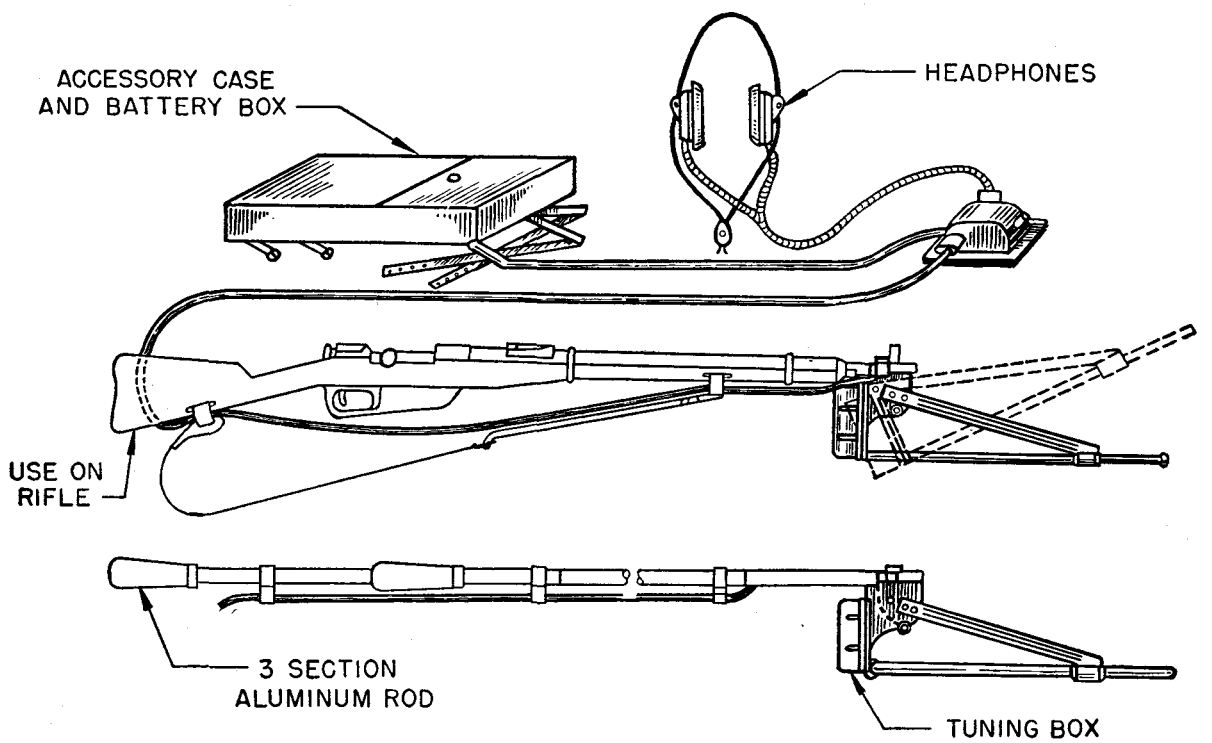


Figure 208. Rifle-mounted VIM–210 mine detector.

Figure 209. Rifle-mounted VIM–210 mine detector in action.

attached to the vertical frame of the search coil. Both models employ the same size coil.

The performance of the VIM–210 detector, with the air as a medium, is as follows:

Target	*Range*
Metal plate (3.9 by 3.9 by .039 inches)	11.5 to 13.5 inches
Tellermine 35	17.5 to 19.5 inches.
S-mine	9.5 to 11.5 inches.
MUV igniter	2 to 2½ inches.

b. VIM–203. The operation and use of the VIM–203 (figs. 210 and 211) is similar to that of the VIM–210 detector. There are two models, the 1941 and the 1942. The 1941 model has a circular search coil, while the 1942 model employs either the circular or the square coil. Apparently, both models can be attached to the muzzle of a rifle, or can be employed with wooden or metal search rods. The rod is approximately 6 feet long, and is in three sections. Each model has a power supply box containing extra tubes, batteries, and a 60-volt dry cell. The tuning box, which is attached to the search coil, contains two tubes and a tuning knob. The entire detector, when disassembled, can be placed in a canvas shoulder carrying bag.

The 1941 model weighs 13.8 pounds, and uses wet batteries developing 2.8 volts and one 60-volt dry cell. It utilizes a search coil 15 inches in diameter. It is capable of 5 hours of continuous operation.

The 1942 model (figs. 212 and 213), with a circular search coil weighing 14½ pounds, uses two batteries developing 4.2 volts and one 60-volt dry cell. The diameter of the search coil is also 15 inches. The 1942 model is capable of 30 hours of continuous operation. The 1942 model also can use a rectangular search coil, which is 11.6 by 13.5 inches.

c. VIM–625 M1942. The VIM–625 M1942 (figs. 214 and 215) is similar to the VIM–203 in appearance and in operation. It has either a circular rubber insulated or a rectangular search coil, 15 inches in diameter, on whose framework is mounted a one-tube tuning box. The tuning control knob is positioned approximately in the center of the face of the tuning box, on the side opposite the operator. The cable from the tuning box is plugged into the power pack carried on the back.

The detector weighs 13.2 pounds, and the power pack weighs 11.2 pounds. The detector is capable of 10 hours continuous use.

Figure 210. VIM–203 mine detector in action.

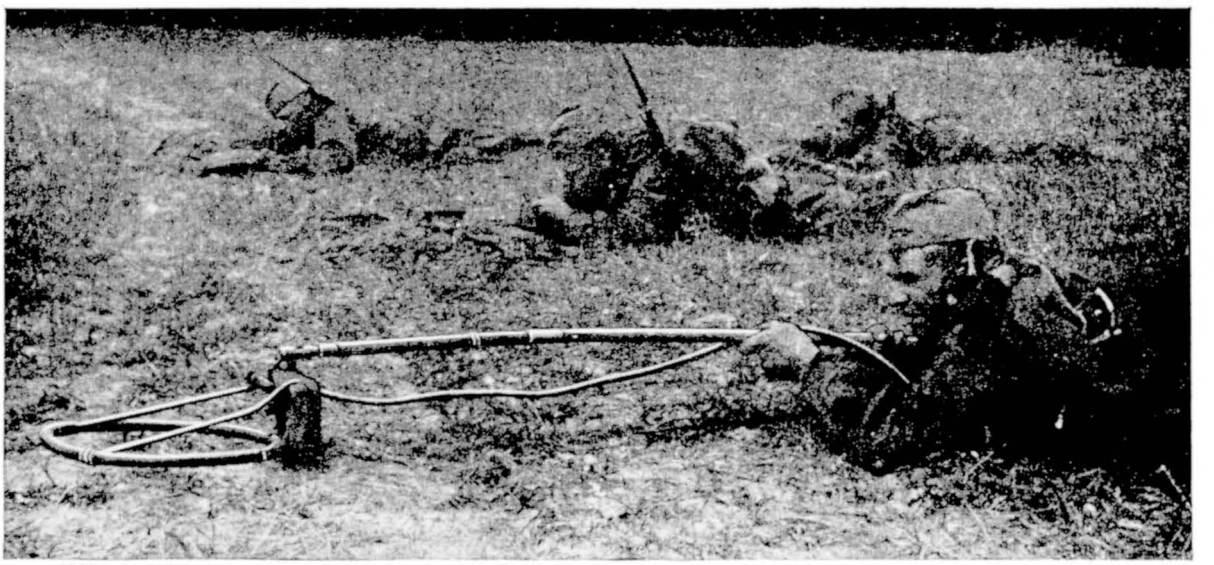


Figure 211. VIM–203 mine detector in action.

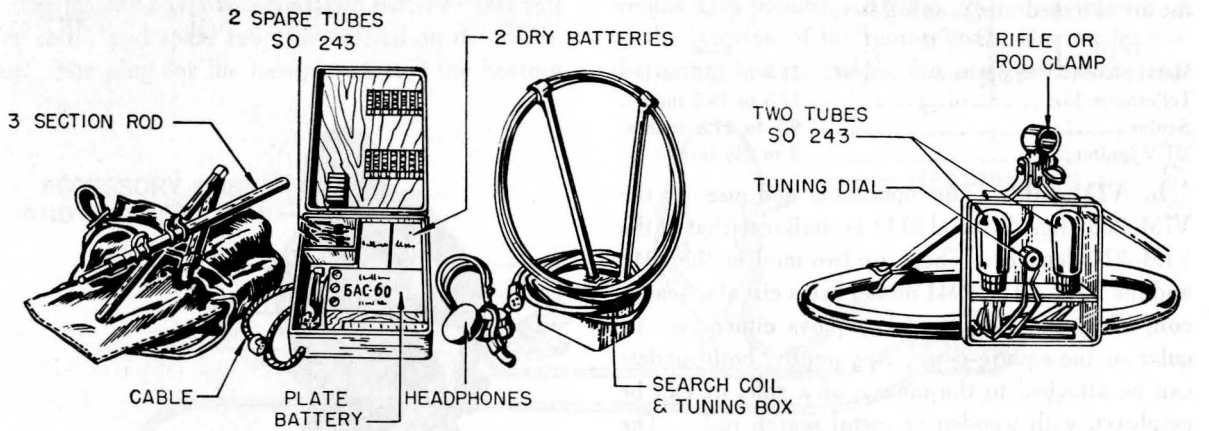


Figure 212. VIM–203 M1942 mine detector with circular search coil.

d. VIM–695 M1942. The VIM–695 M1942 is similar in appearance and in operation to both the VIM–625 and the VIM–203 detectors. It has both a rectangular and a circular search coil. However, the coils are rubber insulated. The diameter of the circular search coil is approximately 15 inches. The tuning box has one tube. The power pack weighs 11.2 pounds, and the detector weighs 13.2 pounds. The detector is capable of 10 hours of continuous use.

e. Electrical mine detector with search spade. This detector consists of a search spade mounted on a wooden-handled bamboo pole and a battery kit with carrying strap and headphones.

The battery kit contains a 90-volt dry cell and a 6-volt storage battery. On one side is a plug for attaching the headphones and the wires from the bamboo search rod. A carrying strap is attached to the kit.

The search rod consists of a bamboo pole, handle, and a search spade. The pole is assembled from two bamboo pieces, each 39 inches long. The hollow center serves as a conduit for the wires running from the handle to the spade. The handle is a

Figure 213. VIM–203 M1942 mine detector in action.

wooden tube mounted on the pole. There is a bronze tube in the handle with a spiral spring, which serves as an antenna. It is connected with the spade by a double cable.

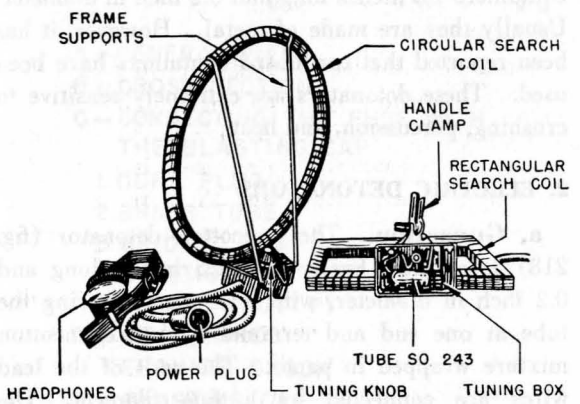


Figure 214. Components of VIM–625 M1942 mine detector.

The spade is fastened at the lower end of the pole. It measures approximately 8.2 by 11.8 inches, and consists of a perforated aluminum tube, approximately 12 inches long and 1½ inches in diameter, and two folding aluminum plates. A radio tube serves as a control lamp.

The equipment hums in response to buried metallic objects at a range of up to 10 feet.

f. Electrical mine detector with search magnet. This is a pear-shaped kit weighing from 4.4 to 6.6 pounds, with headphones and a carrying strap. In the lower part of the kit is a perforated grid-like section containing the search magnet. Above it is a 12-volt battery and a special tube. There is a plug connection for the headphones between the battery and tube.

When the search magnet comes within 6 feet of

a metal object, the detector indicates the object by a checking in the headphones.

g. Three-search coil electrical mine detector. This detector (fig. 216) appears to be an improvisation of the VIM–695 rectangular frame detector. Smaller search coils have been added on opposite ends of the large central rectangular coil, and are supported by a crosspiece. The generator and battery box appear to be carried in a pack, with which the cables from the search coil and the headphones are connected.

h. Horseshoe frame electrical mine detector. This detector has a horseshoe-shaped search coil, which is attached at the end of a hollow pole. A tuning box is mounted on the opposite end of the pole. A battery carrying pack is supported on the front of the body by a carrying strap slung on the shoulder. The headphone and generator box cables plug into the battery box.

Figure 215. VIM–625 M1942 mine detector in action.

Figure 216. Three-search coil mine detector.

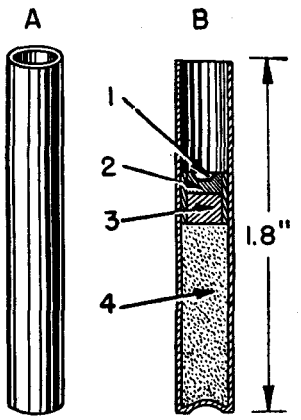
Section IV. DEMOLITION EQUIPMENT

1. NONELECTRIC DETONATORS

Two types of nonelectric detonators are used by the Red Army. One contains a fulminate of mercury filler, and the other (fig. 217) tetryl or TNT with fulminate of mercury or lead azide. Both employ containers 1.8 inches long and 0.2 inch in diameter. Usually they are made of metal. However, it has been reported that cardboard containers have been used. These detonators are extremely sensitive to crushing, percussion, and heat.

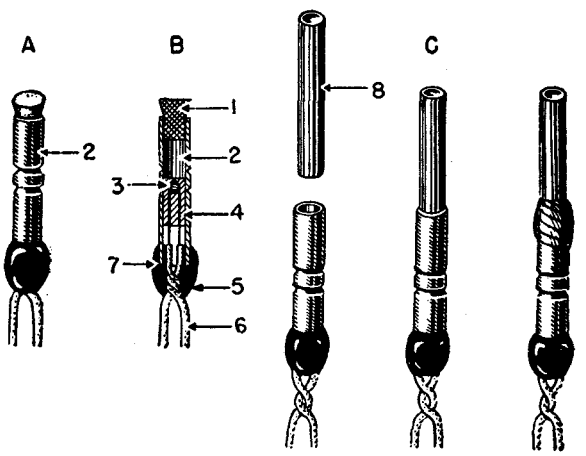
2. ELECTRIC DETONATORS

a. Guncotton. The guncotton detonator (fig. 218) is a small brass tube, 1.5 inches long and 0.2 inch in diameter, with lead wires entering the tube at one end and terminating in a guncotton mixture wrapped in paper. The ends of the lead wires are connected by a fine filament. The opposite end of the tube is plugged with a cork.



A—GENERAL VIEW
B—SECTION
1. METAL CONTAINER
2. TENERES (0.15g.)
3. LEAD AZIDE (0.20g.)
4. TETRYL (1.g.)

Figure 217. Tetryl-lead azide nonelectric detonator.



A—GENERAL VIEW
B—CROSS-SECTION
C—CONNECTING THE FUSE WITH THE BLASTING CAP
1. CORK PLUG
2. BRASS TUBE
3. BRIDGE
4. IGNITION MIXTURE
5. MASTIC (PUTTY)
6. LEAD WIRES
7. EBONITE CHOCK
8. BLASTING CAP

Figure 218. Guncotton electric detonator.

b. Fulminate of mercury. This is a small metal detonator, 2.1 inches long and 0.2 inch in diameter, with lead wires embedded in fulminate of mercury, which is contained in a paper wrapper (fig. 219). The ends of the embedded lead wire are connected by a fine filament.

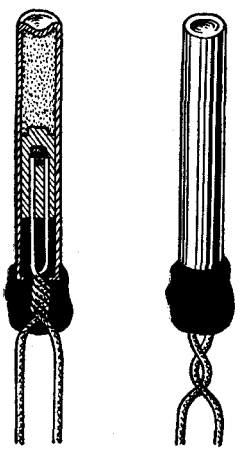


Figure 219. Fulminate of mercury electric detonator.

3. FIRING CABLE

The cable is a seven-strand soldered copper wire, insulated by from two to three layers of rubber. The outer wrappings consist of a tarred linen fabric and a covering of yarn. The following three types of cables are in use:

Characteristics	*Standard*	*Type Light*	*Double*
Number of wires	7	7	14
Weight (pounds per 100 feet)	17	8.5	18
Diameter (inch)	.019	.014	.014

4. FUZES

a. Delayed action time fuze. The delayed action time fuze is a yellow hemp cord, which has been impregnated with an antimony solution. The speed of burning is approximately 0.2 inch per minute.

b. *Pinkovoi Fitil* time fuze. The *pinkovoi fitil* time fuze, which is approximately 0.2 inch in diameter, is soft and flexible. It is covered with a mesh-like fabric, which is reddish-yellow in color. It is sensitive to moisture and emits approximately as much smoke as a smoldering cigarette.

It has a slow burning speed of approximately 0.4 inch per minute. The core contains a dirty-white cotton packing, which is impregnated with chemicals.

727212°—47——11

c. Bickford time fuze. The Bickford time fuze is 0.2 inch in diameter, and has very rapid rate of burning. Three types of wrapping are used: white wrapping for use in dry surroundings, black wrapping for wet surroundings, and brown wrapping for underwater use.

d. Quick fuze. The quick fuze is 0.2 inch in diameter, and burns at a rate of approximately 425 feet per second.

e. Detonating fuze. The detonating fuze is red in color and is approximately 0.2 to 0.3 inch in diameter. It weighs approximately 3.3 pounds per 328 feet (100 meters). It is not sensitive to percussion or cutting.

f. Detonating fuze 31. Detonating fuze 31 has a filling of fulminate of mercury. It can be activated by a bullet. It has a detonating velocity of from 16,400 to 17,400 feet per second.

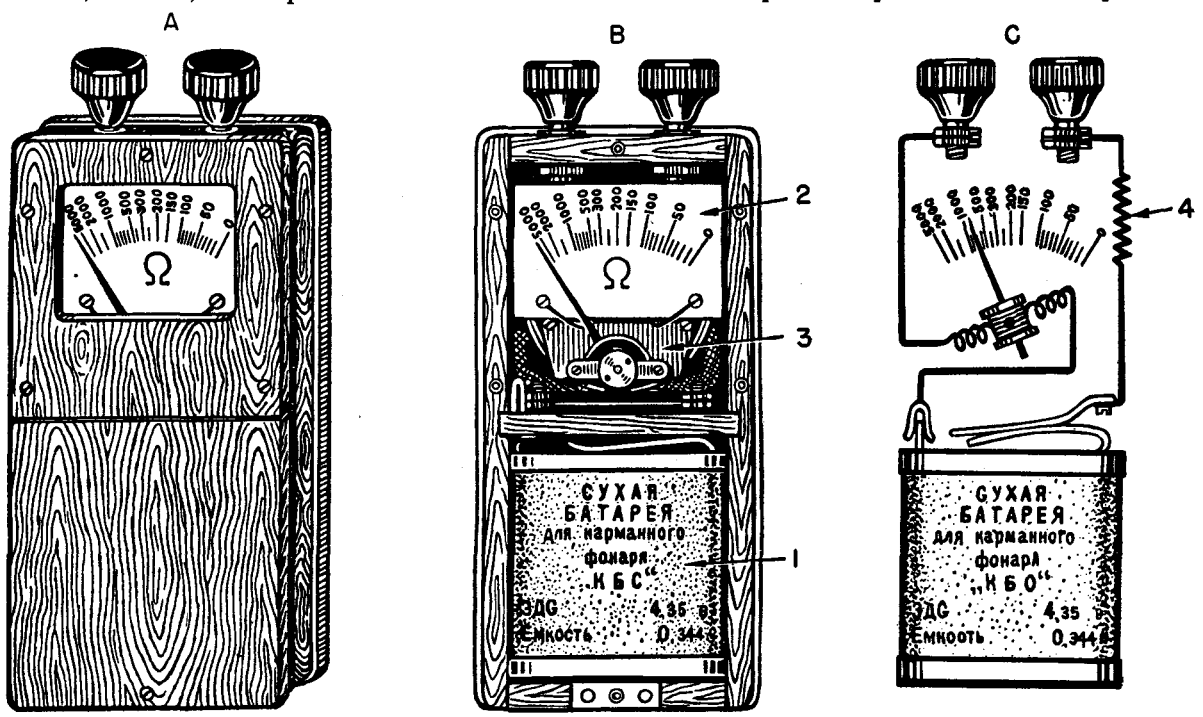
g. Detonating fuze 34. Detonating fuze 34 has a filling of fulminate of mercury and tetryl. It is not sensitive to the impact of a bullet. It has a detonating velocity of from 16,400 to 17,400 feet per second.

h. Detonating fuze 36. Detonating fuze 36 has a filling of hexogen, and is not sensitive to the impact of a bullet. It has a detonating volocity of 26,240 feet per second.

i. Detonating fuze 39. Detonating fuze 39 has a filling of hexogen and tetryl. The detonating velocity is 21,320 feet per second. The fuze is not sensitive to the impact of a bullet.

5. CIRCUIT TESTING INSTRUMENTS

a. Galvanometer. The galvanometer is enclosed in a rectangular case with a carrying handle. The contact posts are positioned on the top of the



A–GENERAL VIEW
B–COVER REMOVED
C–ELECTRICAL DIAGRAM

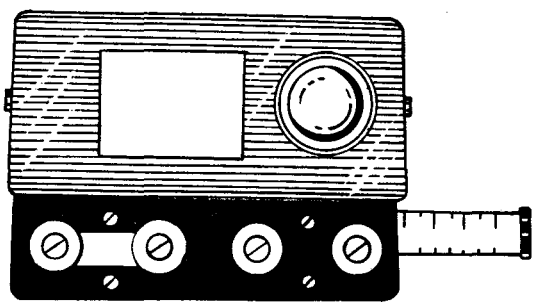
1. BATTERY
2. OHM SCALE
3. GALVANOMETER
4. ADDITIONAL RESISTANCE 300 OHMS

Figure 220. Small (pocket) ohmmeter OK.

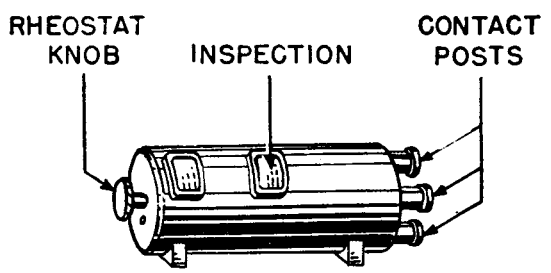
case, underneath the handle. The principle of operation is similar to that of the corps of engineers demolition galvanometer. The instrument also is used to test electrical circuits for continuity when used with a battery in series.

b. Wheatstone bridge. The wheatstone bridge is used to measure electrical resistances and to check or locate circuit defects. It weighs 7.9 pounds and is enclosed in an approximately square box. The contact posts and the dials are protected by a hinged cover.

c. Small (pocket) ohmmeter OK. This instrument (fig. 220) measures resistance up to 5,000 ohms. It uses a 4.35-volt flashlight battery. It is enclosed in a tall, rectangular case. Contact posts protrude from the top. The battery is positioned in the lower portion of the case. The face of the dial is in the upper portion of the case.



RECTANGULAR CIRCUIT DEMOLITION TEST SET



CYLINDRICAL CIRCUIT DEMOLITION TEST SET

Figure 221. Circuit demolition test sets.

d. Medium ohmmeter. A medium ohmmeter has been reported. It consists of movable frame with a wire winding, a horseshoe magnet, and two resistance coils. The dial has two divisions, one from 0 to 100 ohms, and the other from 0 to 100,000 ohms. A box, 7.8 by 4.3 by 7.8 inches and weighing 7.7 pounds, contains 1.5-volt batteries.

e. Combination circuit demolition test set. The Red Army has two standard circuit test sets, rectangular and cylindrical (fig. 221). Both are of metal construction and operate on the same principle. Each has a built-in resistance, which can be varied by a movable slide bar. The calibrations of the upper portion of the slide bar are for checking the PM–1 detonator, and the lower calibrations for the PM–2 detonator. Each box has four contact knobs. Specific contacts are designated for each type of electric detonator.

The rectangular set has two neon bulbs, covered by a pane of glass, on the top of the box and four contact knobs on the long rectangular side of the box. The movable slide bar protrudes beyond the end of the box.

The cylindrical circuit test set has two glass panes, one covering a neon bulb and the other a double calibration scale. At one end is a thumbscrew for setting the resistances. Four contact knobs are positioned on the other end.

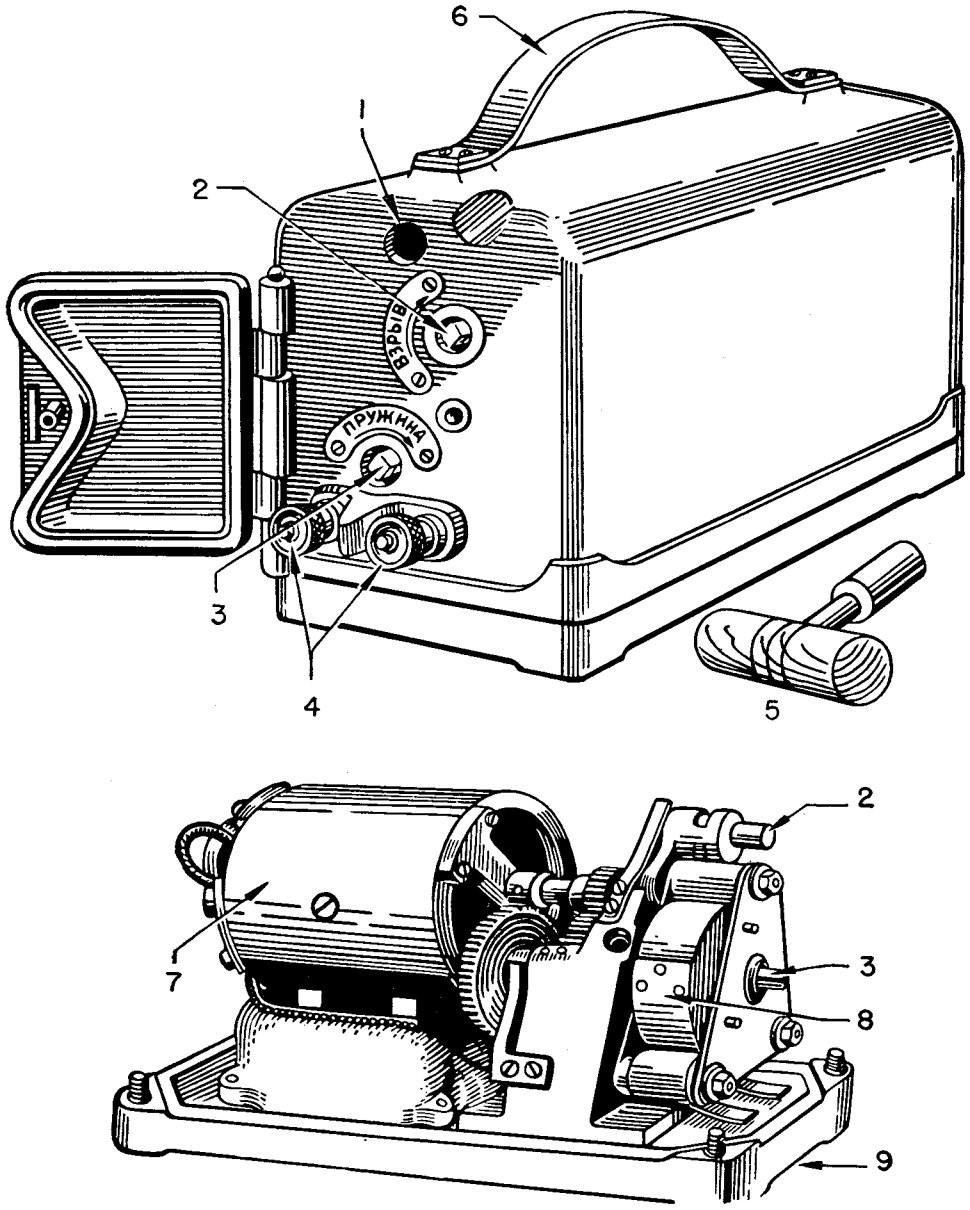
The method of operation is somewhat similar to the British demolition test sets. However, two neon bulbs are used instead of a galvanometer. The neon bulbs light when the circuit under test is in order.

6. BLASTING MACHINES

a. PM–1, 1931. The PM–1 blasting machine (fig. 222) corresponds to the German blasting machine 26. It consists of a dynamo, coil winding spring with drum, pointer with contact, base, key, and trigger. It is capable of firing 100 detonators simultaneously with a firing cable length of 6,500 feet.

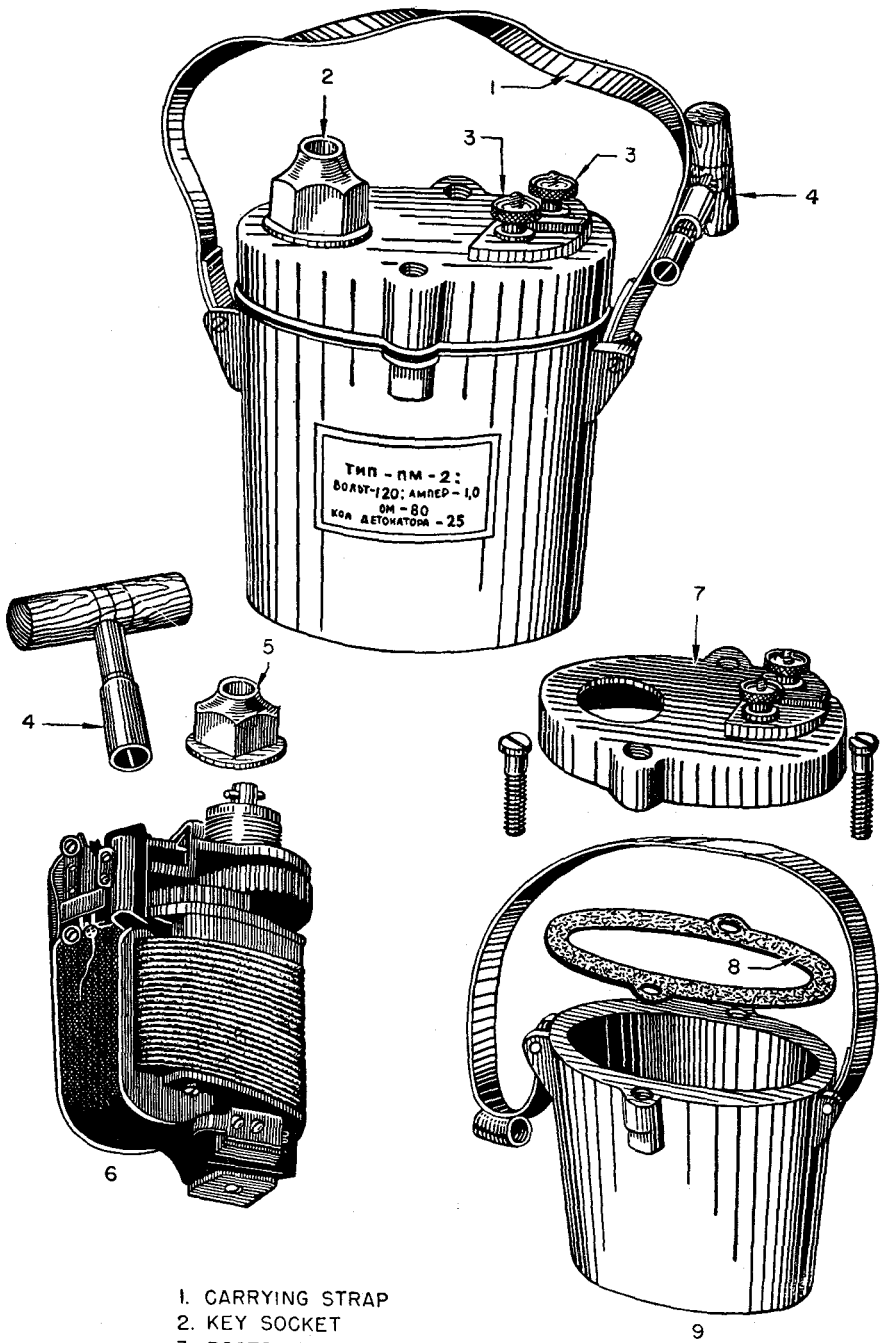
CHARACTERISTICS

Length	8.4 inches.
Width	3.9 inches.
Height	4.9 inches.
Weight	15.4 pounds.



1. KEY SOCKET
2. BLAST SOCKET
3. SOCKET FOR WINDING THE SPRING
4. POSTS FOR LEAD WIRES
5. KEY
6. CARRIER STRAP
7. GENERATOR
8. SPRING
9. BASE

Figure 222. Blasting machine PM–1.



1. CARRYING STRAP
2. KEY SOCKET
3. POSTS FOR LEAD WIRES
4. KEY
5. NUT
6. GENERAL VIEW OF THE MECHANISM
7. COVER
8. RUBBER GASKET
9. BODY

Figure 223. Blasting machine PM–2.

b. PM–2. The PM–2 blasting machine (fig. 223) consists of a dynamo, a transmission unit in a cylindrical metal case, and a handle. It is capable of firing 25 detonators simultaneously with a circuit resistance of 15 ohms.

CHARACTERISTICS

Length	5.3 inches.
Width	3.3 inches.
Height	5.9 inches.

c. Blasting machine. This blasting machine (fig. 224) is very similar to the United States 50-cap blasting machine. It consists of a rectangular wooden box, with two contact posts and a movable plunger on the top of the box. A leather carrying strap is fastened across the top. It is believed to be a 50-cap capacity.

The handle is pulled up to its extremity and, with a sharp downward thrust, turns the dynamo and generates current.

Figure 224. Blasting machine.

7. EXPLOSIVES

Generally, Soviet explosives compare favorably with German and United States explosives. However, they are now more sensitive to concussion and are not so safe. They require handling with care.

a. Pyroxylin.

Form	*Weight*	*Dimensions*
Cube	1 pound	2.1 by 2.5 by 2.5 inches.
12-sided (large)	0.5 pound	1.9 by 2.3 inches.
12-sided (small)	4.2 ounces	1.7 by 2.1 inches.
Bore cartridge	2.1 ounces	2.7 by 1.1 inches.

b. Trotyl or toluol (TNT). This powder has a bright yellow color. It is issued in compressed blocks or cartridges, which are yellow in color.

Form	*Weight*	*Dimensions*
Large block	1 pound	1.9 by 1.9 by 3.9 inches.
Small block	0.5 pound	0.9 by 1.9 by 3.9 inches.
Block or cartridge	2.6 ounces	2.7 by 1.1 inches.

Trotyl (toluol) explosives are safe to handle. They are ignited by fire only with difficulty, and burn with a smoky flame without exploding. They are not sensitive to friction or bullets. They are resistant to water. The gases produced on detonation are poisonous.

Powdered and compressed trotyl is exploded by means of a detonator. For cast trotyl, an additional ignition charge of compressed or powdered trotyl (at least 0.7 ounce) is necessary.

c. Amatol. The weights and dimensions are the same as for trotyl. Amatol has less explosive effect than trotyl, and the size of charge, therefore, must be increased 20 percent. Amatol is yellowish brown with a mica-like sheen. It is sensitive to bullets. Amatol is hygroscopic. When damp, it liquefies and loses its explosive power.

d. Melinite (picric acid). There are three kinds of melinite explosives: powder (color yellow), compressed blocks (color bright yellow), cast mine charges or blocks (color yellow). The weights, dimensions, characterictics, and explosive effect are similar to trotyl.

Melinite is sensitive to bullets. After long contact with metals (except tin, brass or aluminum), melinite forms compounds called picrates, and then is very sensitive to fire, percussion, or friction. The gases produced on explosion are poisonous. Melinite dissolves on prolonged immersion in water. It stains leather and cloth yellow.

e. Explosive blocks (cast and compressed mixtures). The blocks of explosives are of French origin. They are as follows:

Block 80/20.
Block 50/50.
Block 70/30.
Block 50/38/12.

The blocks are safe to handle. The color, dimensions, and weights resemble the blocks of trotyl, but the effect of blocks 50/50 and 50/38/12 is approximately 30 percent less. Blocks 80/20 and 50/50 have additional trotyl ignition charges. Explosive block 50/38/12 is not water-resistant.

f. Grisute bore cartridge. The grisute bore cartridge is approximately 6.3 inches long and from 1.1 to 1.5 inches in diameter. It is wrapped in brown waxed paper, which bears the label and list of ingredients in red print. The explosive consists of a whitish-yellow substance resembling soap flakes.

Grisute is sensitive to percussion, friction, and other effects. It, therefore, is not safe to handle. No iron knives must be used for cutting, but only copper or wooden cutters. Special care must be exercised when grisute is in a frozen or half-frozen state.

The rays of the sun and extreme cold cause decomposition and, under certain circumstances, detonation. Recovered grisute cartridges must be destroyed. In the winter, grisute should be destroyed by blasting, and in the summer by burying.

g. Ammonite and dynamite. Ammonite and dynamite explosives are bright yellow to dirty gray in color. They are only slightly sensitive to mechanical or heat effects. They are not sensitive to bullets. When ignited by fire, they burn away without explosion. When charges are placed in the open, their explosive effect is from 30 to 50 percent less than that of trotyl.

When used in swampy ground or under water, they should be packed in waterproof containers (rubber bags, etc.). Ammonite, when its moisture content exceeds 2 percent, must be dried to the normal moisture content of from 0.5 to 1 percent. Ammonite, which has been in prolonged storage, should be kneaded thoroughly before use.

Section V. RIVER CROSSING EQUIPMENT

1. GENERAL

The Red Army is expert in bridge building. It works mainly with wood, usually obtained locally. Some use of prefabricated bridges also has been noted. The bridges are simply constructed and are of good design. Construction is carried out rapidly, with emphasis on maximum use of manual labor instead of machine tools and equipment. Engineers and technicians are skilled and resourceful, but most labor is of low standard.

Soviet engineers are adept particularly at constructing under-water bridges, which are built approximately 6 to 12 inches below the surface of the water, and vary in size from footbridges to tank bridges. (For details, see ch. V.)

Approximately 3,000 6-ton pneumatic floats were received by the Soviets through lend-lease. But, other than that, no appreciable amount of bridge equipment was obtained.

Many types of organizational floating bridges have been developed by the Red Army. The latest model, developed during World War II, is the TMP, capable of supporting 100-ton loads. The assault footbridge TZI is similar in appearance to the United States footbridge M1938, but improvised footbridges of logs and planks have been employed to augment the lack of organizational equipment. Successive steel trestles, using the standard steel ramp sections as the superstructure, have been used to bridge narrow shallow streams. This is used only as a temporary expedient when this special equipment can be spared from the ponton bridge units. Techniques have been developed for rapid construction of sturdy multiple-span structures. Complex truss systems, capable of supporting the heaviest loads, are built of ordinary logs, thus indicating that the Soviets possess a thorough knowledge of structural design and erection techniques.

Numerous varieties of organizational assault boats are known to exist, but invariably, these are supplemented by boats of local construction. In addition, bridge pontons are used as assault boats.

In general, Soviet ponton and floating bridge equipment is comparable to United States types and is adequate for the heaviest loads. It should be noted, however, that no evidence exists of new developments comparable to United States aluminum pontons and decking.

2. BOATS AND PONTON USED IN ASSAULT CROSSINGS

a. Small (rubber) pneumatic boat LMN (fig. 225).

CHARACTERISTICS

Length	10.5 feet.
Beam	4 feet.
Depth	1.3 feet.
Weight	95 pounds.
Crew	1.
Capacity	5 men or 1,400 pounds.
Assembling time	5 minutes.

b. Small collapsible boat MSL. The MSL is used for reconnaissance.

CHARACTERISTICS

Length	11 feet.
Beam	3.9 feet.
Depth	1.3 feet.
Weight	132 pounds.
Crew	1.
Capacity	4 men or 800 pounds.
Assembling time	1 minute.

c. Collapsible assault boat DSL. DSL's frequently are used in pairs.

CHARACTERISTICS

Length	18 feet.
Beam	4.9 feet.
Depth	1.7 feet.
Weight	375 pounds.
Crew	2 or 4.
Capacity	10 to 12 men, 45-mm. gun, or 3,000 pounds.
Assembling time	3 minutes.

d. Pneumatic mountain boat LG–12. The LG–12 is used for assault purposes.

CHARACTERISTICS

Length	16.4 feet.
Beam	5.25 feet.
Depth	1.6 feet.
Weight	176 pounds.
Crew	3.
Capacity	10 to 12 men or 3,000 pounds.
Assembling time	5 minutes.

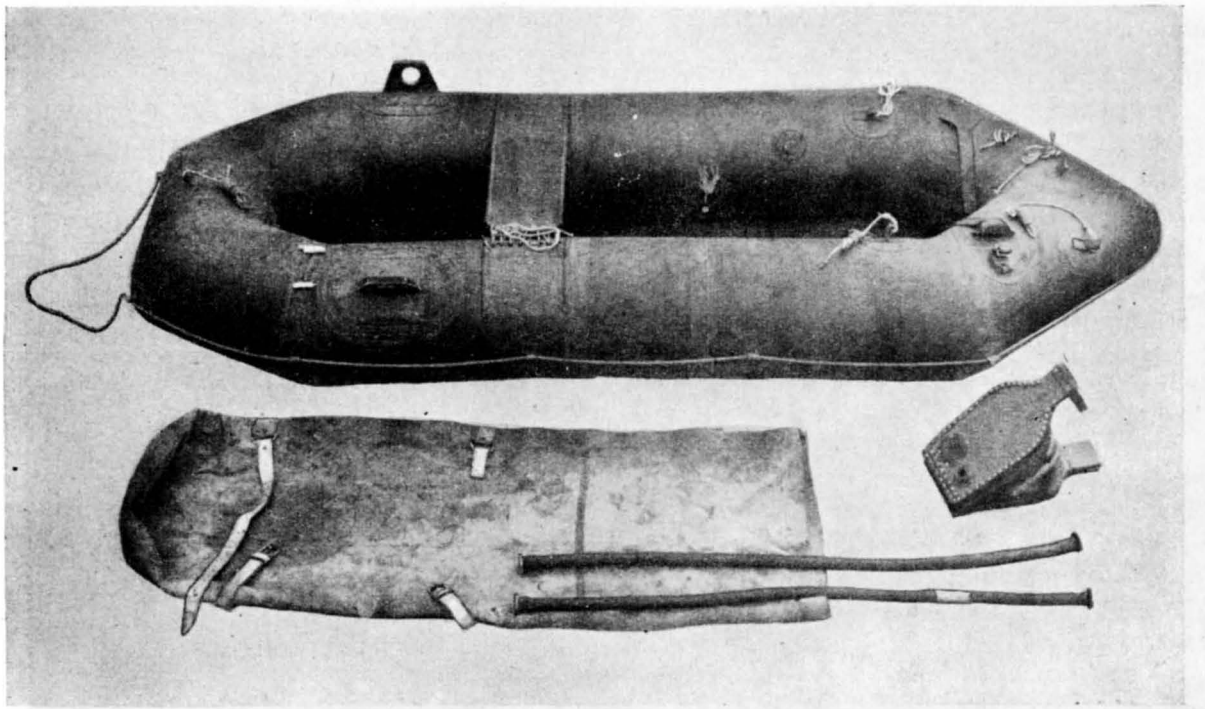


Figure 225. LMN small (rubber) pneumatic boat.

Figure 226. A–3 pneumatic ponton.

Figure 227. A–3 pneumatic ponton used to support raft.

e. Wooden assault boat SDL.

CHARACTERISTICS

Length	22.3 feet.
Beam	4.9 feet.
Depth	1.6 feet.
Weight	660 pounds.
Crew	3 or 5.
Capacity	10 to 12 men or 4,000 pounds.
Assembling time	1 minute.

f. Pneumatic ponton A–3. This ponton (figs. 226 and 227) is the standard floating support for the UVS, MdP, and MP ponton-bridge units. It is used also for assault purposes.

CHARACTERISTICS

Length	20 feet.
Beam	7.5 feet.
Depth	2.8 feet.
Weight	990 pounds.
Crew	10 or outboard motor and crew of 2.
Capacity	20 men, 76-mm. gun, or 6,000 pounds.
Assembling time	7 minutes.

g. Light ponton section DLP of the DLP–43 light ponton bridge unit. This section may be used as an assault boat.

CHARACTERISTICS

Length	15 feet.
Beam	6.2 feet.
Depth	3 feet.
Weight	704 pounds.
Crew	5 to 9 or outboard motor and 2.
Capacity	6,000 pounds.
Launching time	3 minutes.

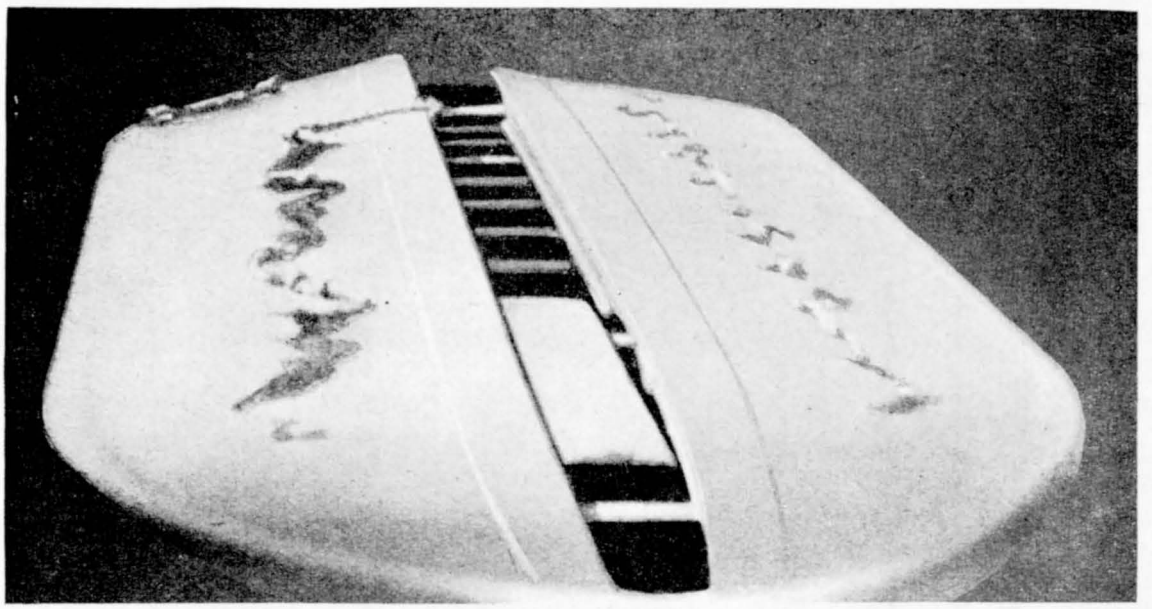


Figure 228. NLP light plywood ponton in folded position.

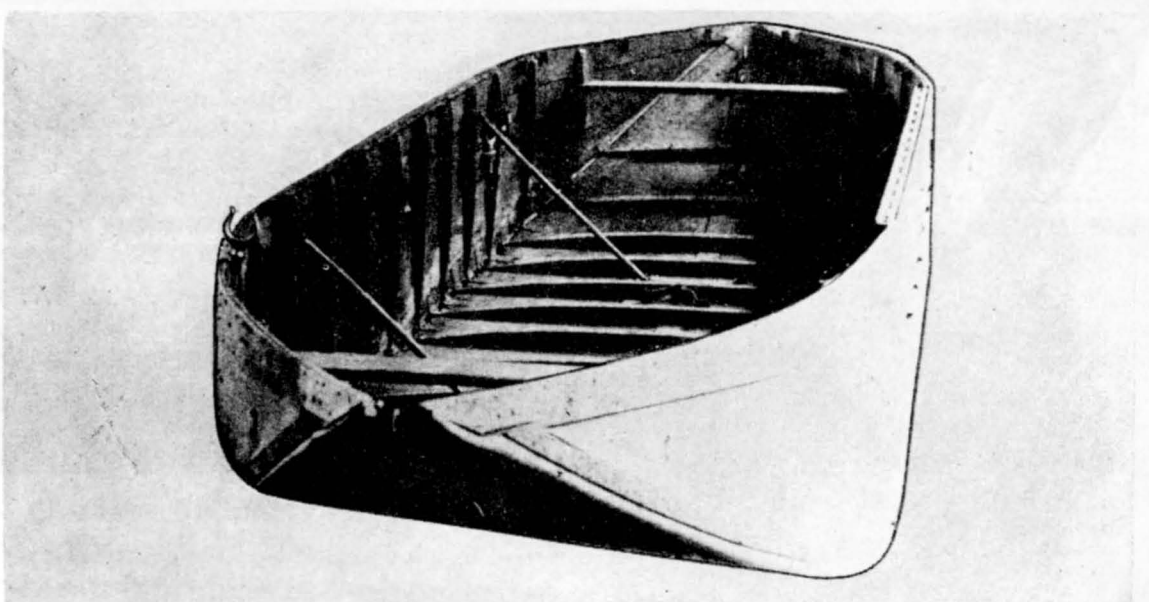


Figure 229. NLP light plywood ponton.

Figure 230. NLP light plywood ponton used to support raft.

h. Light plywood ponton NLP of the NLP ponton bridge unit. This ponton (figs. 228, 229, 230, and 231) may be used as an assault boat.

CHARACTERISTICS

Length	23 feet.
Folded	25 feet.
Beam	6 feet.
Folded	6.4 feet.
Depth	2.7 feet.
Folded	0.8 feet.
Weight	990 pounds.
Crew	5 to 9 or outboard motor and 2.
Capacity	10,000 pounds.
Assembling time	5 minutes.

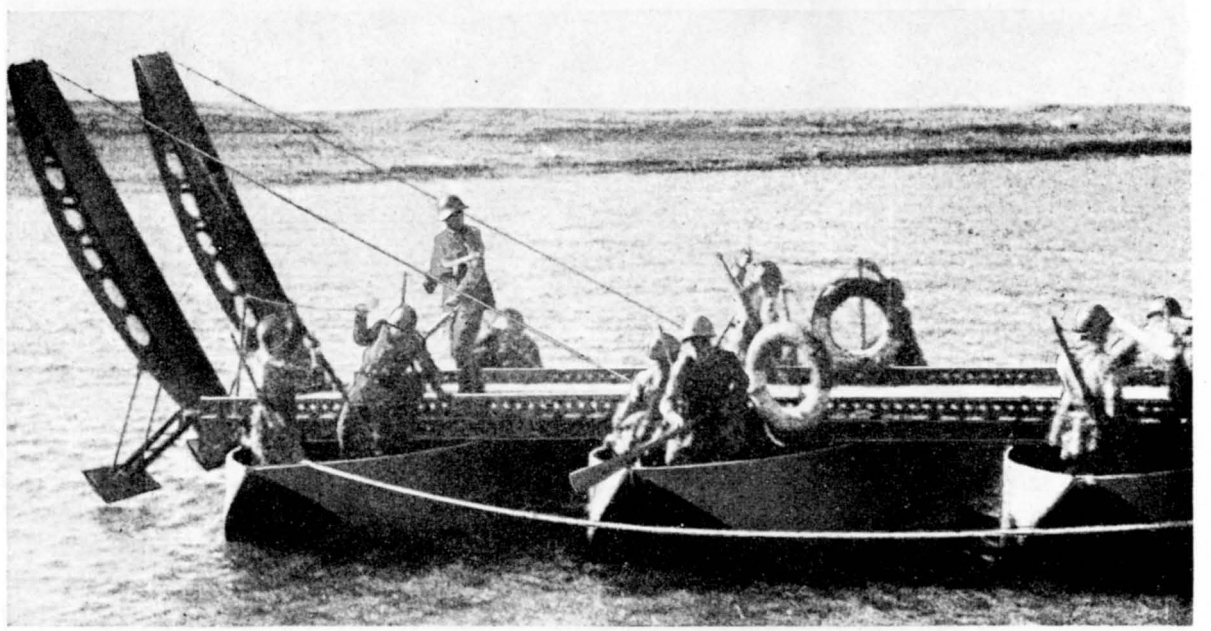


Figure 231. Five-ton ferry assembled from NLP light plywood pontons and steel ramps.

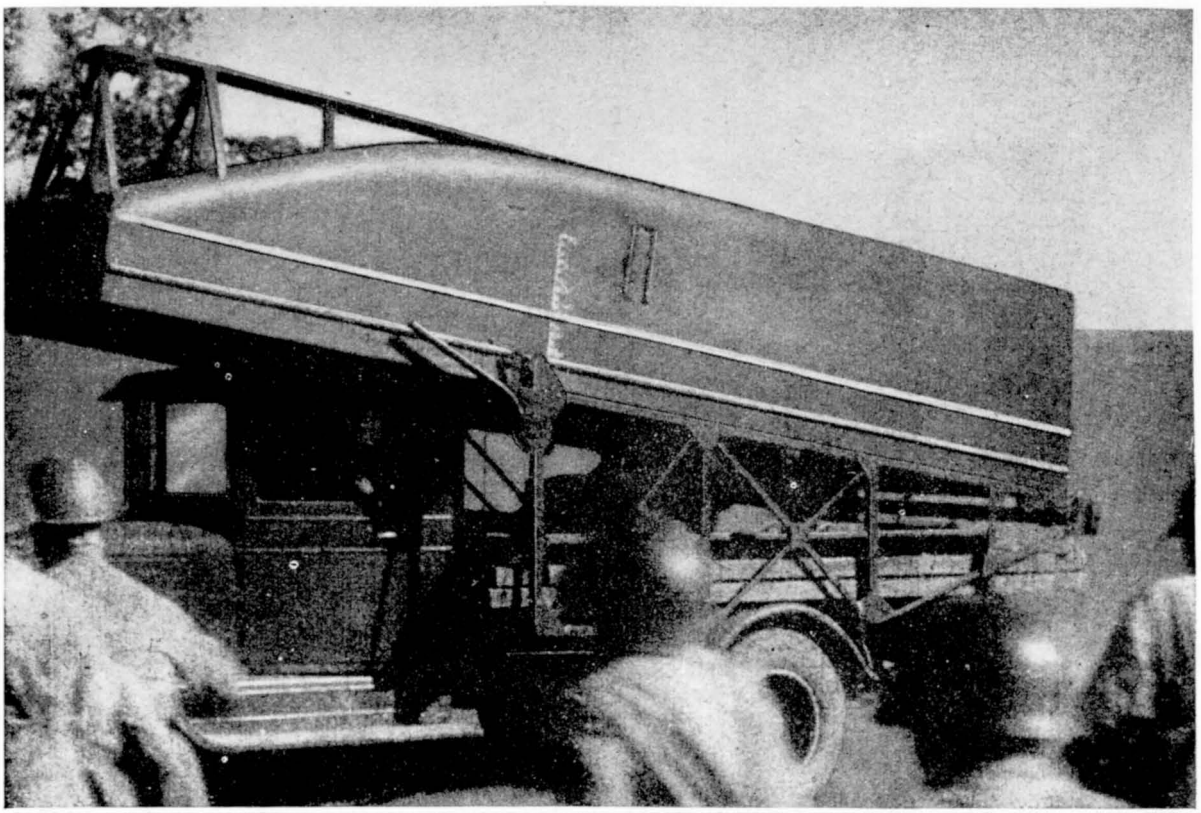


Figure 232. N2P steel ponton section with steel frame.

i. Steel ponton section (N2P, N2P–41, or DMP–42) of medium ponton bridge unit. These sections (figs. 232, 233, and 234) may be used as assault boats.

CHARACTERISTICS

Length	17.4 feet.
Beam	7.2 feet.
Depth	3.5 feet.
Weight	2,090 pounds.
Crew	5 to 9 or outboard motor and 2.
Capacity	12,000 pounds.
Launching time	5 minutes.

3. ASSAULT FOOTBRIDGES

Two standard types of footbridges are used by the Red Army, the TZI bridge for crossings of less than 200 feet and the DDP for crossings up to 400 feet. This equipment is supplemented by plank and log footbridges constructed at the crossing site when narrow streams are encountered. Individual footbridge sections often are used as ferries, carrying up to 8 men (fig. 235), and as rafts (fig. 236).

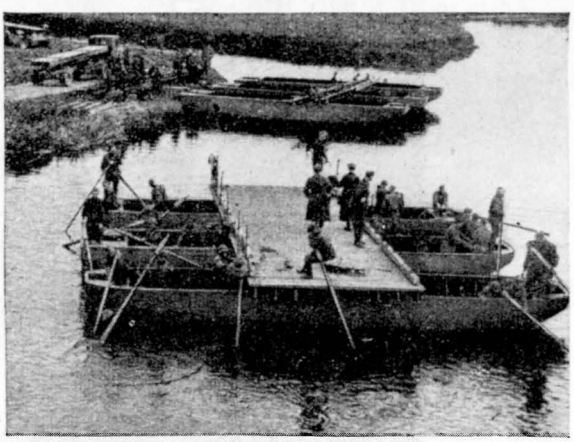


Figure 233 Thirty-three-ton raft supported by N2P steel pontons.

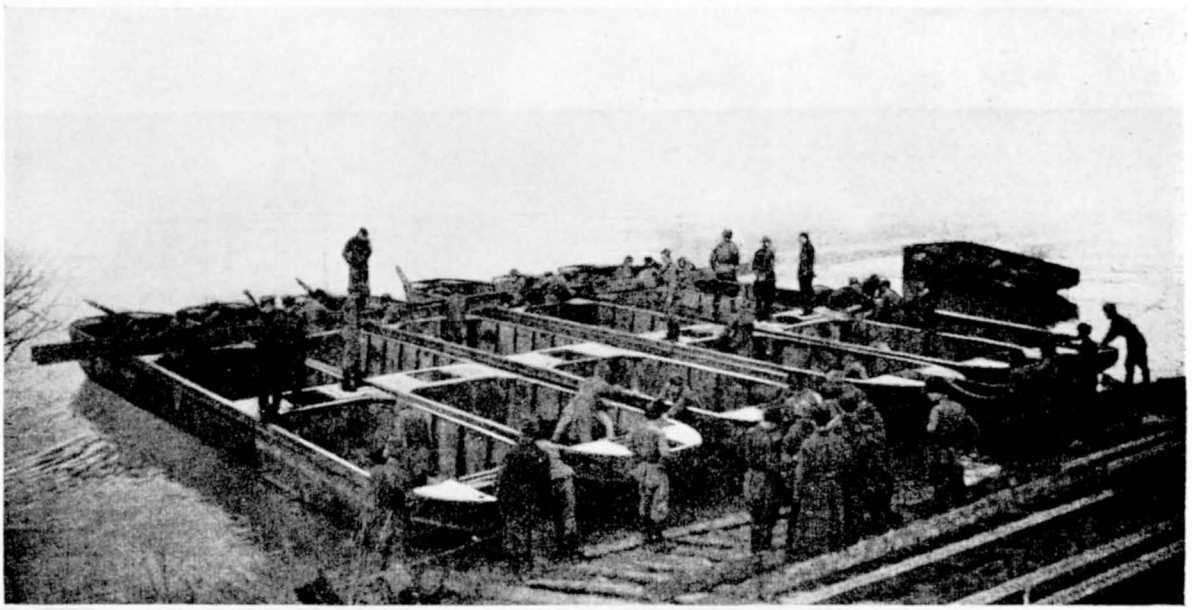


Figure 234. Reinforced steel ponton N2P raft.

Figure 235. TZI ferry.

Figure 236. TZI raft.

a. Nonsinkable equipment TZI (figs. 237 and 238).

CHARACTERISTICS

Length of section	11.4 feet.
Length of bridge:	
Single lane	184 feet.
Double lane	92 feet.
Width:	
Single lane	2.3 feet.
Double lane	4.6 feet.

b. Footbridge DDP on NLP light plywood pontons.

CHARACTERISTICS

Length (section)	15.6 feet.
Length of bridge:	
Single lane (1-ton cap)	394 feet.
Triple lane (3-ton cap)	131 feet.
Width of single lane	2.5 feet.
Width of single section	7.5 feet.
Wooden boats	48 per set.

(16 ferries of 3 boats each, capacity 2 tons each.)
(12 ferries of 4 boats each, capacity 3 tons each.)

Figure 237. TZI nonsinkable float.

Figure 238. TZI nonsinkable float footbridge.

Figure 239. Footbridge constructed on NLP light plywood pontons.

4. STANDARD FLOATING BRIDGE EQUIPMENT

a. NLP ponton bridge unit. For details of this light ponton and trestle equipment, see figures 239 and 240.

b. MP and improved MdP ponton bridge unit. For details of this light ponton and trestle equipment, see figures 241 and 242.

	Type 1	Type 2	Type 3
Type bridge	Cantilever-hinge	Cantilever-hinge	Rigid.
Length over-all	456 feet	325 feet	253 feet.
Length floating	427 feet	295 feet	223 feet.
Capacity	5.5 tons	10 tons	17.6 tons.
Floating unit	Plywood folding boat.		
Unit beam	6 feet.		
Unit length	23 feet.		
Unit depth	2.7 feet.		
Superstructure	Timber decking on balk.		
Track width	8.9 feet.		
Bay length	15 feet	11 feet	8 feet.
Type ferries	2-boat, 29.5 by 8.9 feet	3-boat, 29.5 by 8.9 feet	4-boat, 29.5 by 8.9 feet.
Ferry capacity	5.5 tons	10 tons	17.6 tons.
Maximum axle load	3 tons	5.5 tons	8 tons.
Number ferries from 1 28-boat unit.	14	9	4.

Figure 240. Characteristics of NLP ponton bridge units.

Figure 241. MP or improved MdP ponton bridge unit.

	Type 1	Type 2	Type 3.
Type bridge	Cantilever-hinge	Cantilever-hinge	Rigid.
Length over-all:			
MP	364 feet	295 feet	151 feet.
MdP	233 feet	220 feet	141 feet.
Floating unit	A–3 pneumatic ponton.		
Unit length	20 feet.		
Unit beam	7.5 feet.		
Unit depth	2.8 feet.		
Weight of unit	990 pounds.		
Superstructure	Timber decking on 6 balk	Timber decking on 9 balk	Timber decking on 12 balk.
Track width	8.2 feet	8.2 feet	29.0 feet.
Bay length	15 feet	12 feet	
Type ferries	2-ponton, 27 by 7.5 feet	3-ponton, 27 by 7.5 feet	8-ponton, 33 by 8.5 feet.
Ferry capacity	5.5 tons	10 tons	15 tons.
Maximum axle load	3 tons	5 tons	8 tons.
Number ferries from 1 ponton unit.	11	8	3.

Figure 242. Characteristics of MP and improved MdP ponton bridge units.

c. DLP ponton bridge unit, 1943. For details of this medium ponton and trestle equipment, see figure 243.

d. DMP and improved DMP–42 ponton bridge unit. For details of this medium ponton and trestle equipment, see figure 244.

e. N2 and N2P–41 ponton bridge unit. For details of this heavy ponton bridge and trestle equipment, see figures 245 and 246.

	Type 1	Type 2	Type 3
Type bridge	Cantilever-hinge	Rigid	Rigid.
Bridge length over-all	489 feet	328 feet	190 feet.
Bridge length, floating	404 feet	289 feet	161 feet.
Capacity	13 tons	20 tons	38 tons.
Floating unit	Plywood ponton bow section.	Plywood bow and center ponton section.	Plywood ponton 2-bow center section.
Unit length	15 feet	26.6 feet	41.6 feet.
Unit beam	6.2 feet top 4.7 feet bottom	6.2 feet top 4.7 feet bottom	6.2 feet top. 4.7 feet botton
Unit depth	3 feet	3 feet	3 feet.
Unit weight	704 pounds	1,408 pounds	2,112 pounds.
Superstructure	Timber decking on 6 balk.	Timber decking on 9 balk.	Timber decking on 12 balk.
Track width	10 feet	10 feet	20 feet.
Bay length	15 feet	15 feet	7.5 feet.
Type ferries	4 bow sections	4 full sections	4 3-section ferries.
Ferry capacity	13 tons	20 tons	38 tons.
Number ferries from 1 bridge unit.	10	6	4.

Figure 243. Characteristics of DLP ponton bridge units, 1943.

	Type 1	Type 2	Type 3	Type 4
Type bridge	Cantilever-hinge	Cantilever-hinge	Rigid	Rigid.
Bridge length:				
DMP		423 feet	210 feet	100 feet.
DMP–42	2,034 feet	864 feet	443 feet	234 feet.
Capacity		17.5 tons	33 tons	55 tons.
Floating unit	Sectional ponton.			
Superstructure	Timber decking on balk.			
Track width	8.8 feet	11.7 feet	11.7 feet	23.4 feet.
Bay length	25 feet	16.5 feet		
Type ferries	2-ponton, 21 by 11.7 feet.	2-ponton, 21 by 11.7 feet.	4-ponton, 42 by 11.7 feet.	8-ponton, 2 lanes each, 42 by 11.7 feet.
Ferry capacity	10 tons	17.5 tons	33 tons	55 tons.
Number ferries from 1 bridge unit.	20	20	10	5.

Figure 244. Characteristics of DMP and improved DMP–42 ponton bridge units.

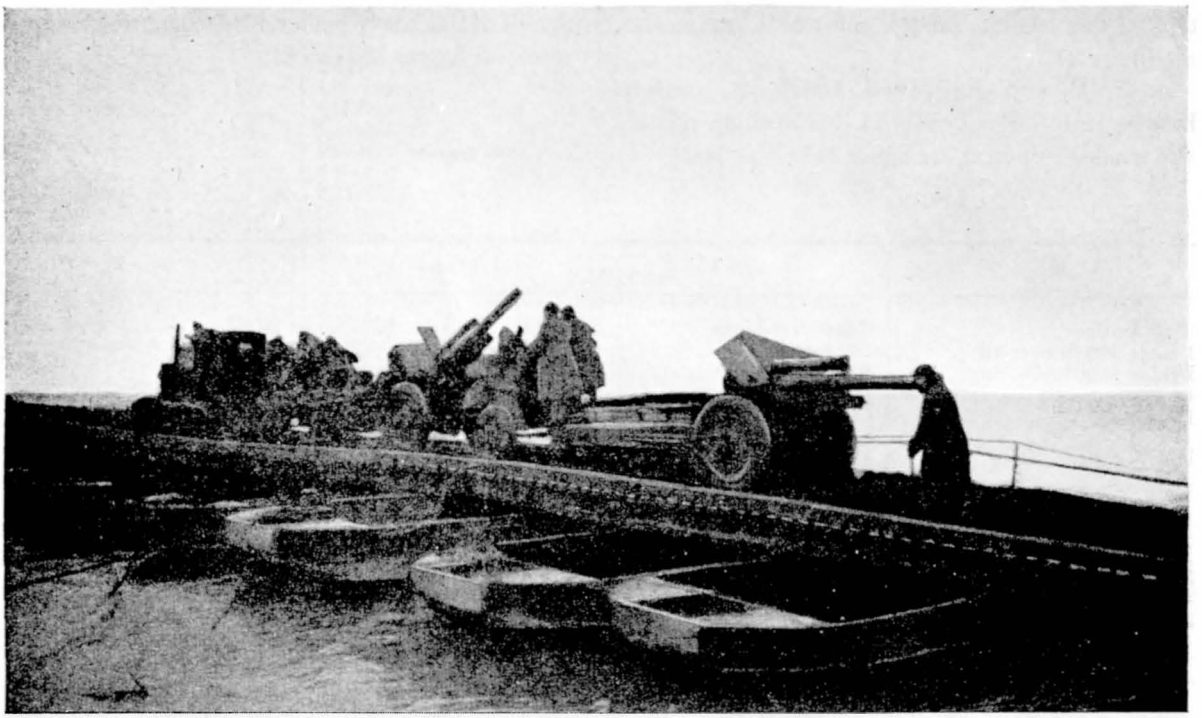


Figure 245. N2P–41 ponton bridge unit.

	Type 1	Type 2	Type 3	Type 4
Type bridge	Cantilever-hinge	Cantilever-hinge	Rigid	Rigid.
Bridge length over-all:				
N2P–41	610 feet	466 feet		253 feet.
N2P	525 feet	348 feet		210 feet.
Bridge length floating:				
N2P–41	482 feet	404 feet		210 feet.
N2P	423 feet	285 feet		190 feet.
Bridge capacity	17.5 tons	33 tons		66 tons.
Floating unit	Sectional steel ponton.	Sectional steel ponton.		Sectional steel ponton.
Unit length	17.4 feet	35 feet		52 feet.
Unit beam	7.2 feet	7.2 feet		7.2 feet.
Unit depth	3.5 feet	3.5 feet		3.5 feet.
Unit weight	2,090 pounds	4,180 pounds		6,490 pounds.
Superstructure	Timber decking on 6 balk.	Timber decking on 8 balk.		2-lane timber decking on 14 balk.
Track width	10.7 feet	10.7 feet		21.4 feet.
Bay length	10 feet	9 feet		
Type ferries	2 3-section ponton, 54 by 10.7 feet.	3 3-section ponton, 54 by 10.7 feet.	4 4-section ponton, 59.7 by 10.7 feet.	4 4-section ponton, 2-lane, 59.9 by 10.7 feet.
Ferry capacity	17.5 tons	33 tons	55 tons	66 tons.
Number ferries from 1 bridge unit.	8	5	3	2.

Figure 246. Characteristics of N2P and N2P–41 ponton bridge units.

	Type 1	Type 2	Type 3	Type 4	Type 5
Bridge length over-all.	1,460 feet		748 feet	623 feet	358 feet.
Bridge length floating.	1,220 feet		600 feet	420 feet	304 feet.
Bridge capacity	17.5 tons		55 tons	66 tons	110 tons.
Floating unit	Sectional steel ponton.		Sectional steel ponton.	Sectional steel ponton.	Sectional steel ponton.
Superstructure [1]					
Track width	10.5 feet		13 feet	13 feet	2 lane, 26 feet.
Bay length	15 feet		15 feet		
Type ferries	2 2-section pontons, 36 by 10.5 feet.	3 2-section pontons, 36 by 13 feet.	3 3-section pontons, 53 by 13 feet.	3 3-section pontons, 53 by 13 feet.	4 4-section pontons, 2 lanes each 66 by 13 feet.
Ferry capacity	17.5 tons	33 tons	55 tons	66 tons	110 tons.
Number ferries from 1 bridge unit.	18	12	8	6	3.

[1] Timber decking in balk or steel stringers.

Figure 247. Characteristics of TMP ponton bridge units.

f. TMP ponton bridge unit. For details of this heavy ponton bridge and trestle equipment, see figure 247.

5. FIXED BRIDGES

No known organizational fixed bridge equipment was used by the Red Army during World War II, except short bridges of steel trestle and ramp spans in shallow water. (For special types and designs, see ch. V.)

a. N2P bridge unit.

CHARACTERISTICS

Weight of trestle (total)	1,211 pounds.
Transom	330 pounds.
Threaded columns (2 by 190)	380 pounds.
Base plate (2 by 90)	180 pounds.
Trestle key (2 by 17.5)	35 pounds.
Backstay beam (2 by 143)	286 pounds.
Dimensions:	
Transom (over-all)	12 feet.
Column spacing (center to center)	7 feet.
Height trestle above base plate (maximum).	8 feet, 8 inches.
Height trestle above base plate (minimum).	3 feet, 10 inches.
Ground pressure (maximum)	2,550 pounds per square foot.

Backstay beams are used for loads in excess of 30 tons.

6. MISCELLANEOUS EQUIPMENT

a. Steel ramps. Ramps have leg supports at one end, adjacent to the hinged bracket which fastens to the balk of the first ponton. Each ramp consists of two frames held rigid by diaphragms.

CHARACTERISTICS

Length	11 feet, 9 inches.
Track width	1 foot, 3 inches.
Leg depth	4 feet, 8 inches.
Ramp thickness (maximum)	1 foot, 6 inches.
Ramp weight (each)	400 pounds.
Leg weight (each)	110 pounds.
Hinged bracket weight (each)	110 pounds.

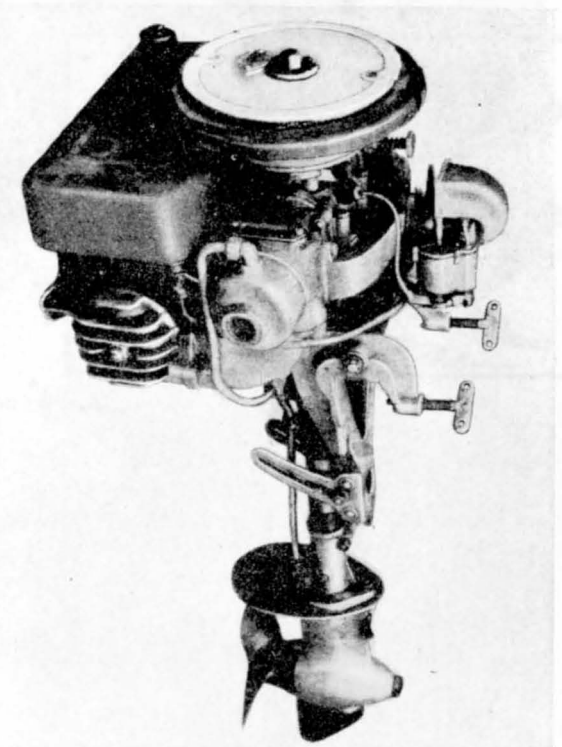


Figure 248. Ten-horsepower outboard motor.

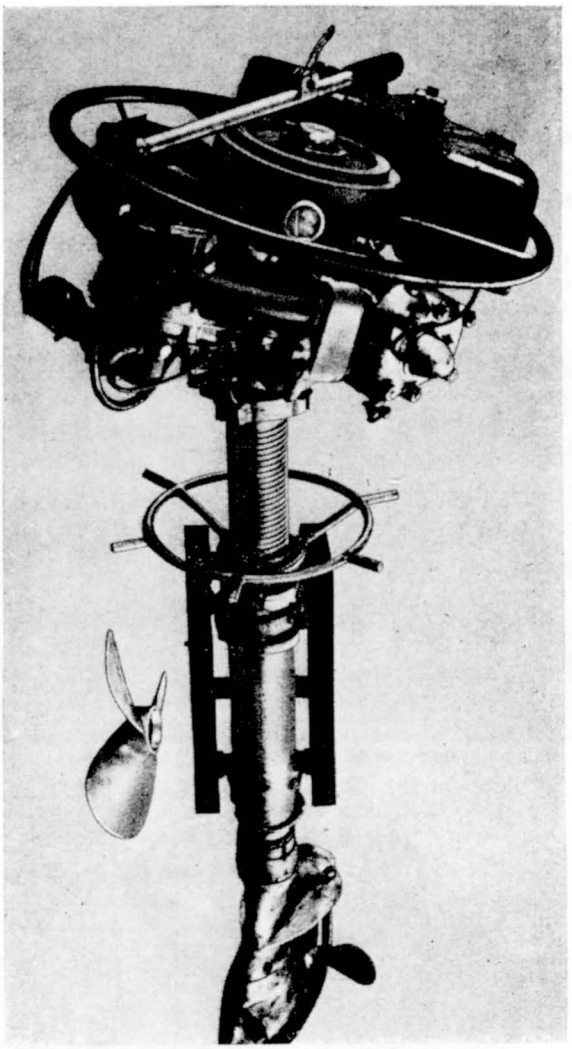


Figure 249. Fifteen-horsepower outboard motor.

b. Outboard motors. Outboard motors may be used during river-crossing operations.

10-horsepower outboard motor. This is a two-cylinder, 10-horsepower engine, approximately 4 feet, 2 inches high (fig. 248). It is believed that a Japanese model BV6 motor is very similar.

15-horsepower outboard motor. This is a two-cylinder, 15-horsepower engine and apparently is 5 feet, 2 inches high, including rudder equipment (fig. 249). The motor is alleged to be of Japanese manufacture. It is used with A–3 pneumatic ponton boats.

7. TANK BRIDGE

A tank chassis, with a special superstructure designed to allow another tank to cross over the top, has been developed for crossing of antitank ditches and small water obstacles (fig. 250). It also provides a scaling wall for infantry or a bridge approach for a sharp embankment.

The Red Army also has perfected a simple device for lifting tanks and vehicles out of mud, sand, or snow when the vehicle cannot extricate itself under its own power or traction. The device, a board, is placed in front of the wheels, and the cable is attached by a deep loop to a "Z" iron on the board. The other end of the cable is locked between the two tires. When the wheels turn, the cable lifts the wheels onto the board and pulls the latter under the wheel.

8. IMPROVISED RIVER CROSSING EQUIPMENT

The Red Army is very adept at improvising many types of equipment from material at hand (figs. 251 through 260). Many means are adopted to supplement standard floating bridge equipment.

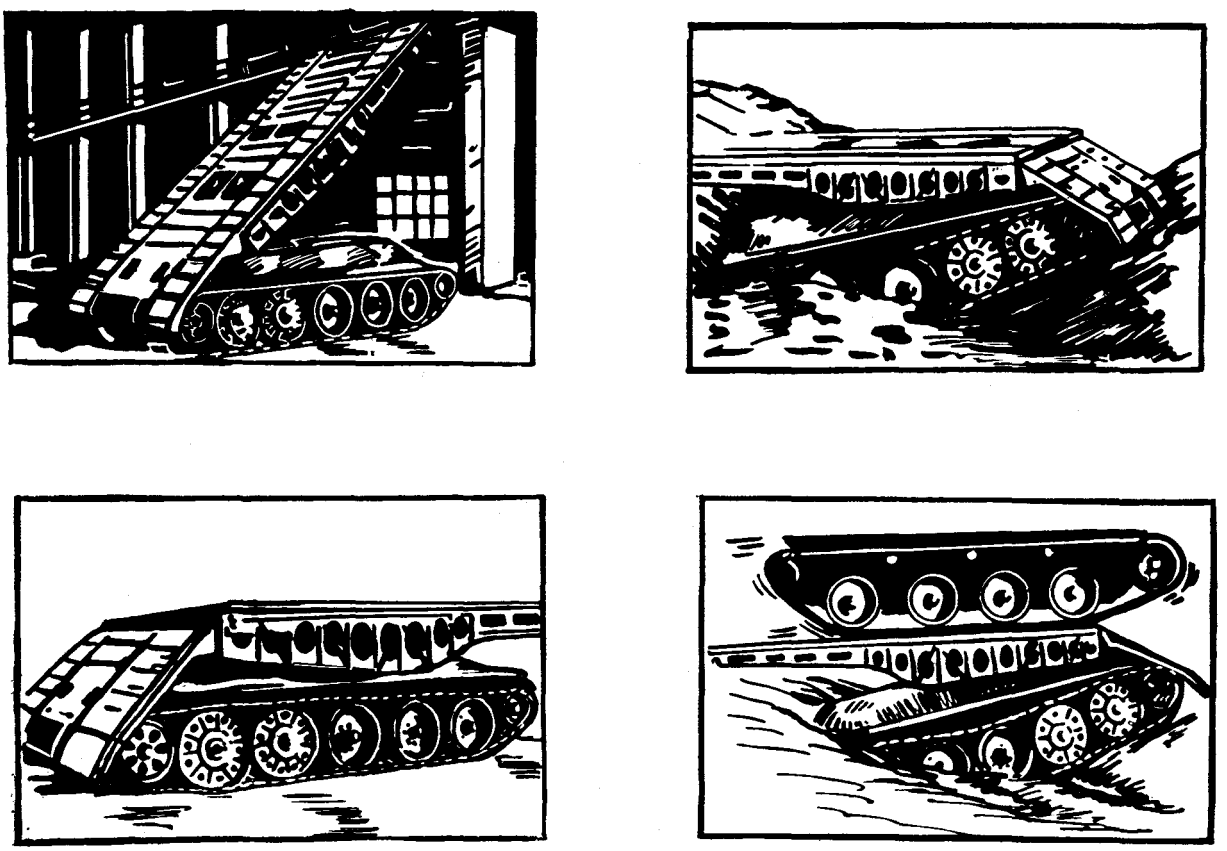


Figure 250. Tank bridge.

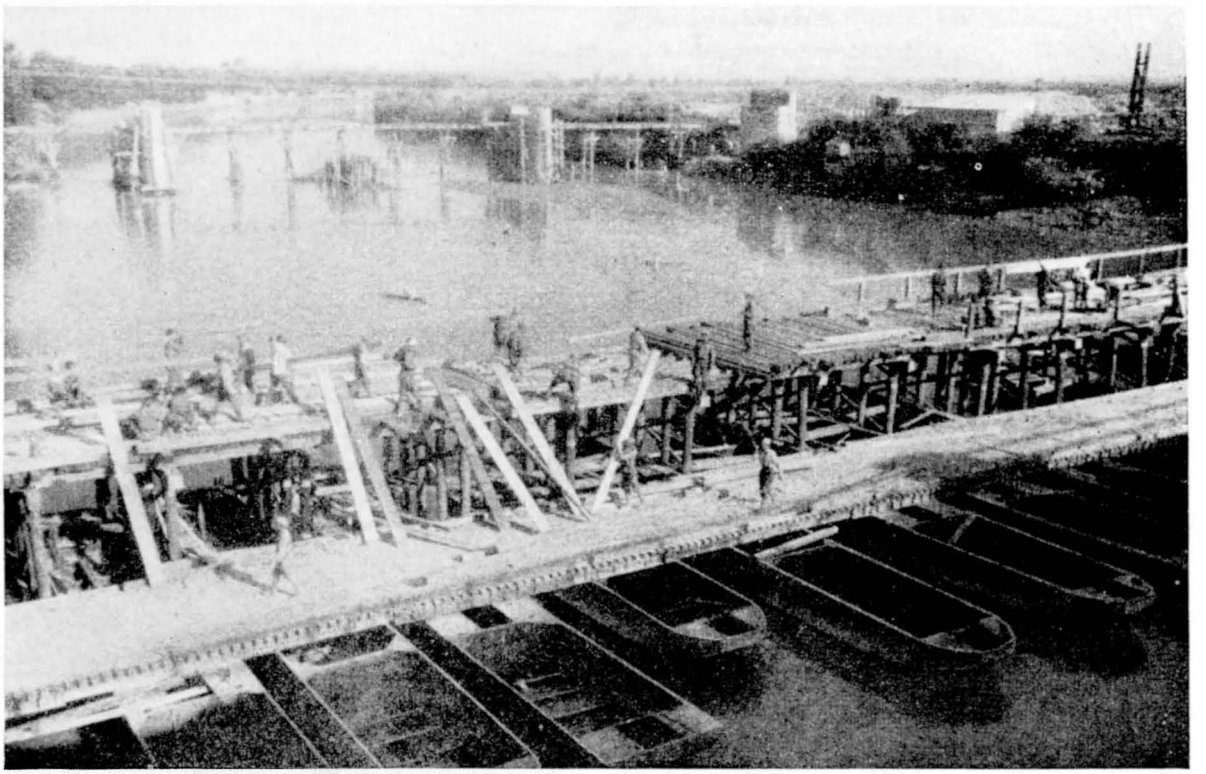


Figure 251. Pile bent bridge. Note old ponton bridge.

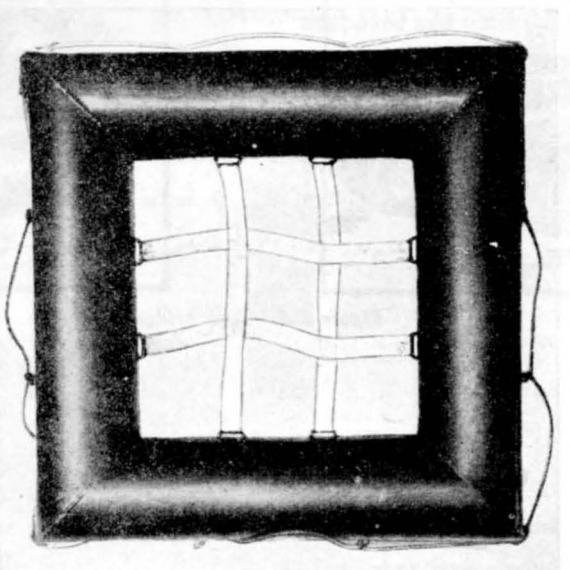


Figure 252. Improvised raft made by welding 12.5-inch sheet iron pipes together.

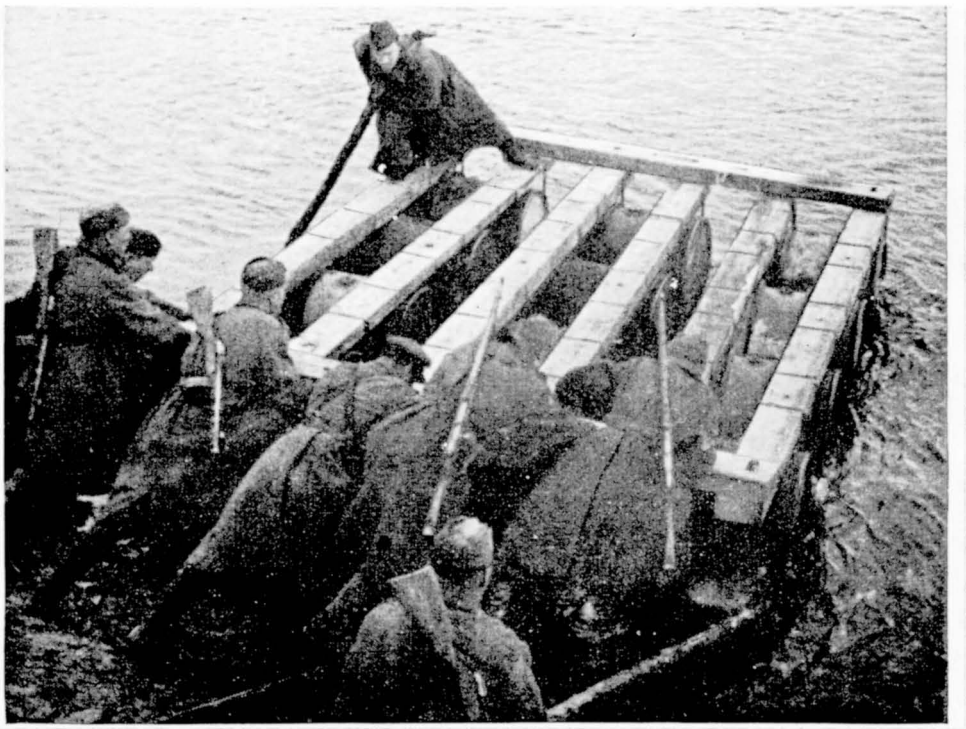


Figure 253. Improvised oil drum raft.

Figure 254. Expedient river crossing utilizing local materials.

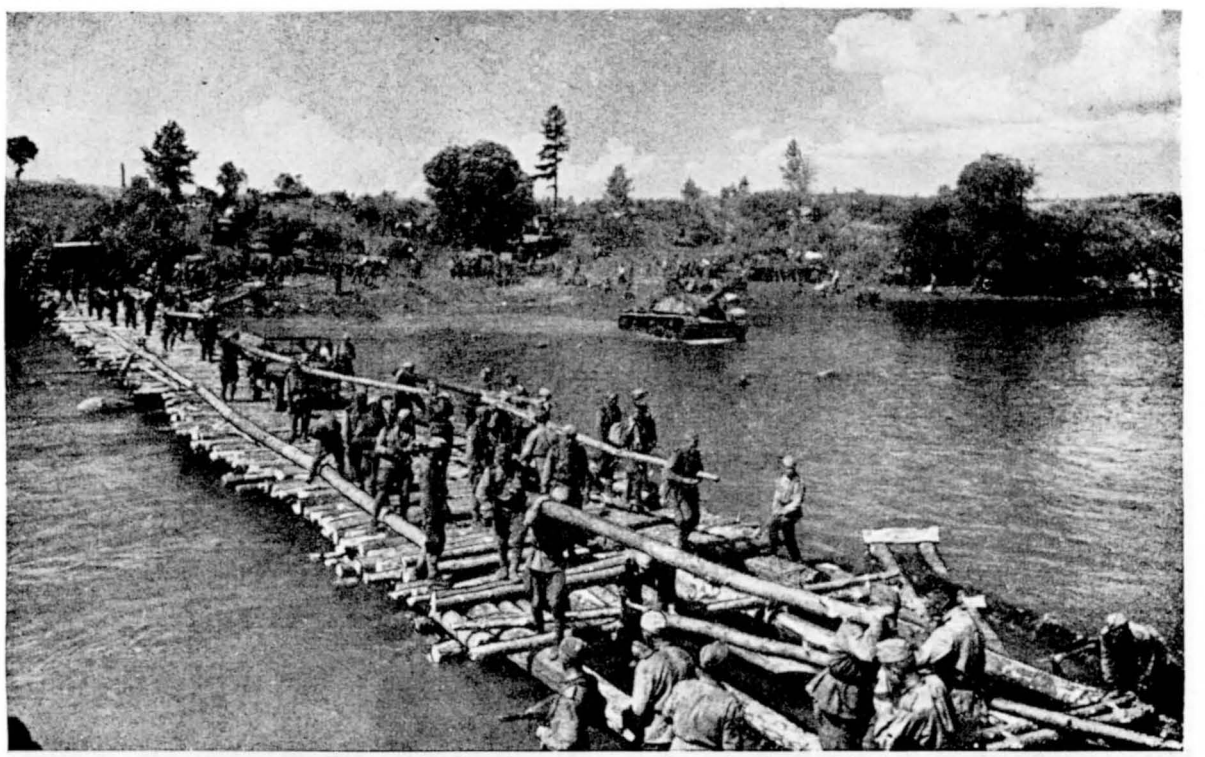


Figure 255. Expedient crossing utilizing local materials.

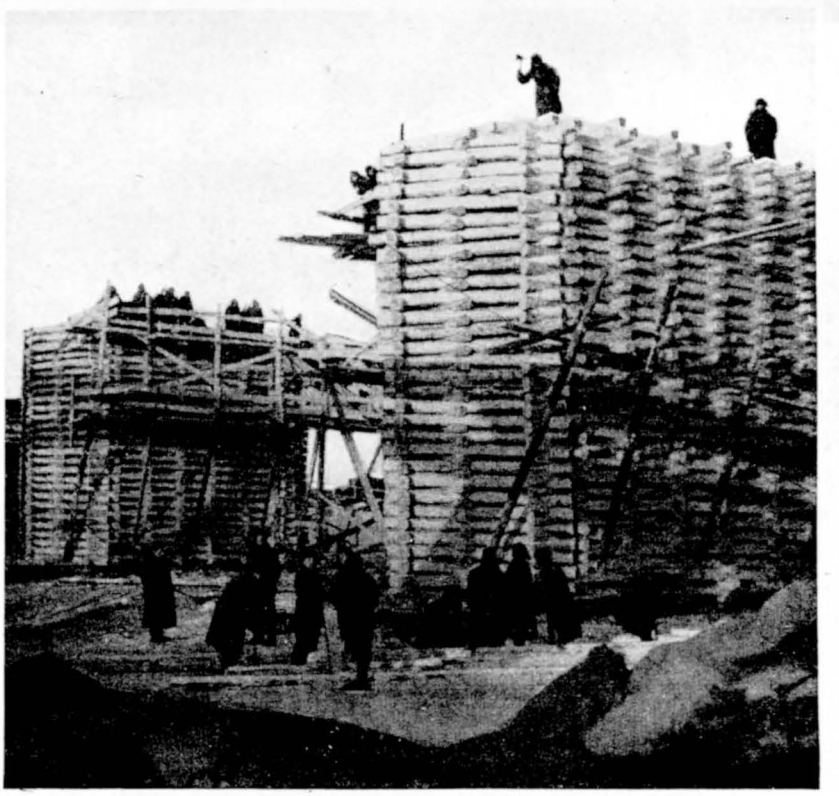


Figure 256. Timber crib construction.

Figure 257. Improvised cable suspension bridge.

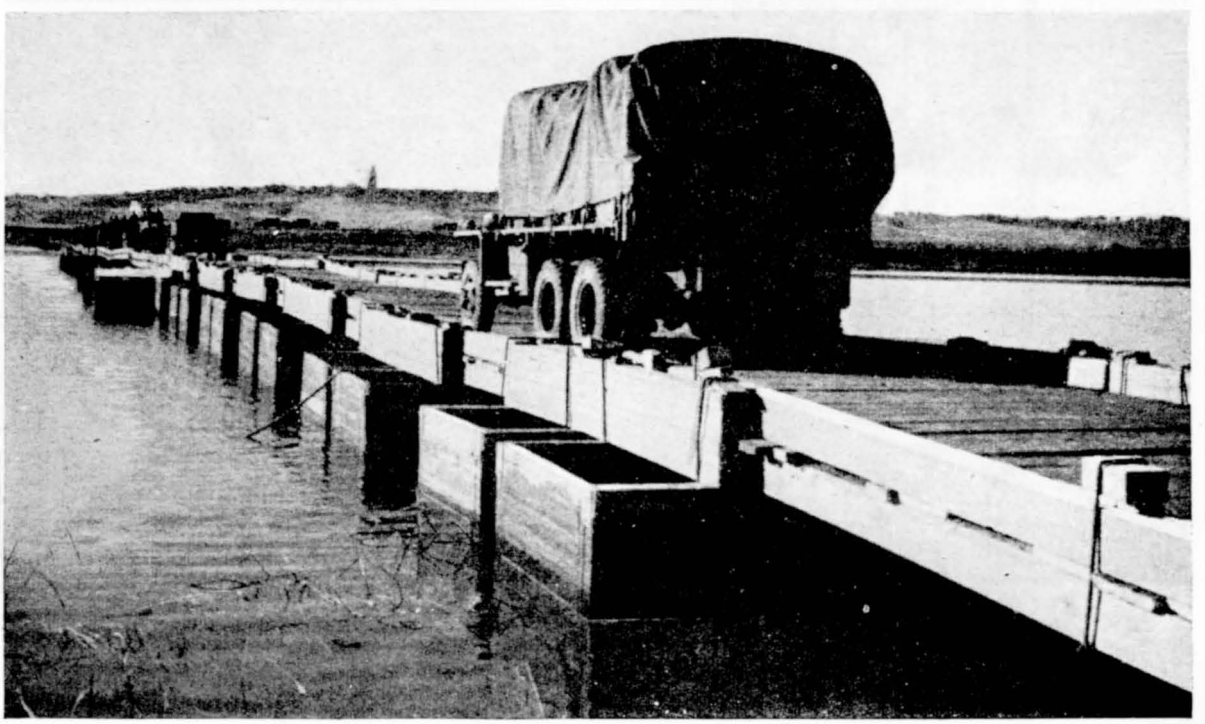


Figure 258. Improvised wooden pontons used for bridge construction.

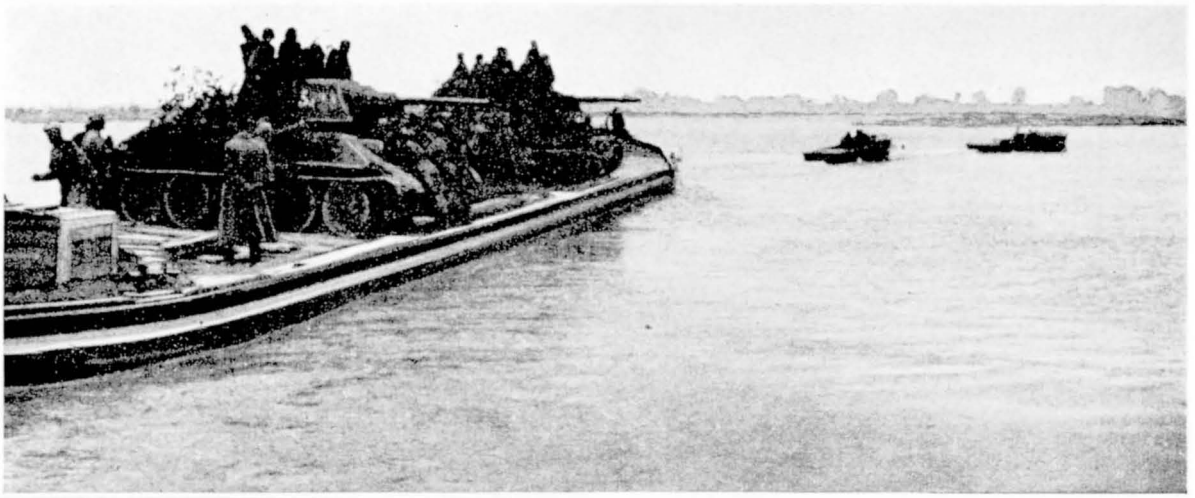


Figure 259. Utilizing a barge as a raft.

Figure 260. Pantographic type footbridge constructed with wood paling.

Section VI. FLAME THROWERS

1. GENERAL

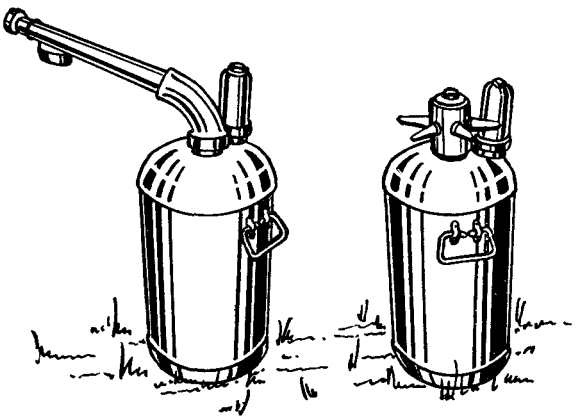
The Red Army is known to be equipped with two types of flame throwers, the FOG and the ROKS–2. In addition, the obsolete KhT–26 light tank has been equipped as a flame thrower. It is known that flame-thrower equipment has been installed on the T–34 chassis. The FOG flame thrower generally is employed, with remote control electric ignition, in defensive operations. The ROKS–2 is a close range infantry combat weapon. The ease of operation and simplicity of construction of both these weapons is characteristic of Soviet design.

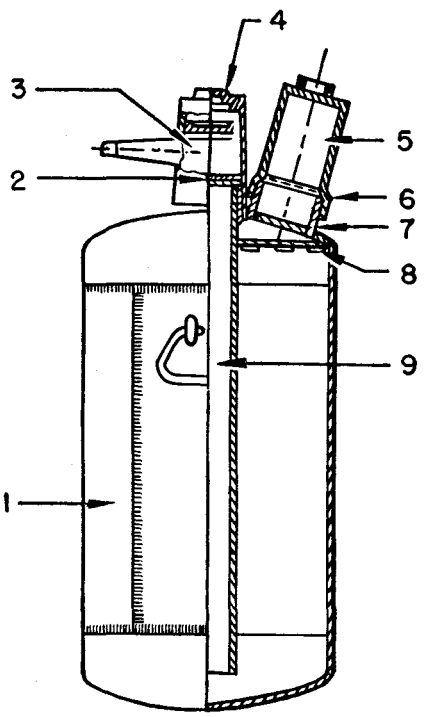
2. FOG FLAME THROWER

The FOG static flame thrower (fig. 261) consists of a cylindrical metal fuel container, interchangeable jets, and a powder chamber. It functions as an electrically ignited fougasse. It is installed in the ground and frequently has been used in ambush, especially in narrow approaches and at river crossing points. Although single units may be employed, the FOG generally is installed in groups of from three to five. A PM–1 or PM–2 blasting machine normally is used for ignition.

The base and lid of the container are welded to the body. In the center of the lid is welded a threaded collar for screwing on the interchangeable heads. The collar has a pressure tube which extends almost to the bottom of the container. A threaded fitting for screwing on the powder chamber is welded on the side of the lid. There is a sieve on the base of this fitting to prevent the flame of the powder charge from entering the fuel container. Two interchangeable nozzle heads are provided, one head being a jet pipe and the other a five-jet head for covering a circular area.

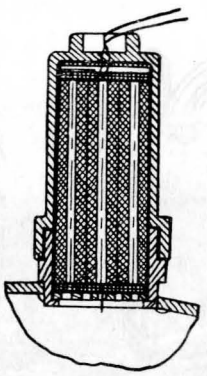
Burning of the powder, fired electrically, in the powder chamber (fig. 262) produces pressure in the fuel container, which forces the fuel up the pressure tube and through the nozzle head. The fuel is ignited in the ignition chamber by means of a priming cap with electric igniters (fig. 262). The flame thrower is capable of one short burst only.



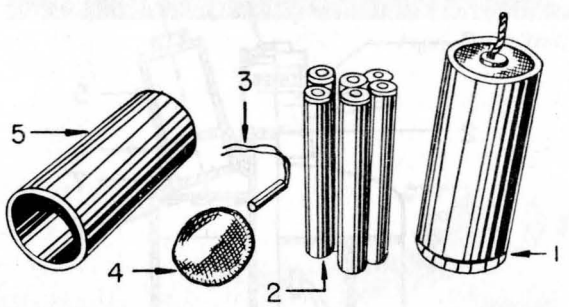


1. BODY
2. COLLAR
3. 5-JET HEAD
4. IGNITION CAP
5. POWDER CHAMBER
6. WATERPROOFING
7. STRAINER
8. GRID
9. PRESSURE PIPE

Figure 261. FOG static flame thrower.



POWDER CHAMBER



1. CARTRIDGE (CHARGED)
2. POWDER CAPS (LENGTH 5.1")
3. ELECTRIC DETONATOR
4. SACK (CONTENTS 1 GRAM OF BLACK POWDER)
5. CARDBOARD CASE

CARTRIDGES

Figure 262. Powder chamber and electric ignition cartridges for FOG static flame thrower.

CHARACTERISTICS

Weight (loaded)	114 to 121 pounds.
Weight (empty)	70 to 77 pounds.
Height	27.5 inches.
Diameter	11 inches.
Capacity	6.6 gallons.
Normal pressure	610 to 760 pounds/sq. in.
Diameter of jet pipe nozzle (approx.).	1.1 inches.
Diameter of nozzles (5-nozzle head) (approx.).	0.5 inch.
Range:	
Jet pipe nozzle:	
Viscous fuel	140 to 155 yards.
Thin-liquid fuel	55 to 65 yards.
5-jet nozzle:	
Viscous fuel	100- to 110-yard radius.
Thin-liquid fuel	50- to 55-yard radius.

3. ROKS–2 PACK FLAME THROWER

This close range combat weapon (fig. 263) consists of a fuel container, shaped like a knapsack field pack, a flexible hose, and a rifle-shaped jet gun with an ignition system. The entire apparatus normally is carried by one man. Carrying straps are attached to the front wall of the fuel container, and both the backplate and the carrying straps are padded. A cloth tool kit is attached on the front plate. Head winds of more than 10-feet-per-second velocity result in self-destruction of the operator.

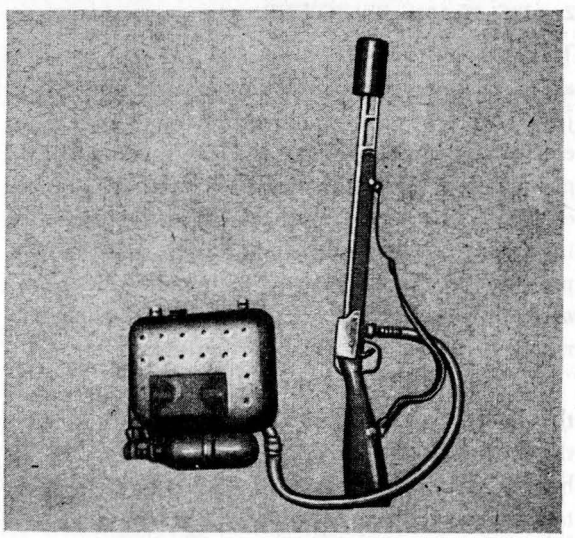


Figure 263. ROKS–2 flame thrower.

Accessories of the ROKS–2 flame thrower are a leather cartridge pouch, holding the percussion primers and cotton waste, a linen cloth tool kit, and a rifle sling and belt. In addition, extra steel nitrogen flasks and hand pumps are available.

The steel plate fuel container is filled through a large filling plug on the top side of the container. The nitrogen flask is connected with the fuel container by means of a valve attached to the side of the air pipe. The flask and pipe are connected with a reducer, which reduces the pressure of the flask to the pressure of the fuel container. The reducer has a safety valve, which opens when the safety limit is exceeded.

The ingnition mechanism, consisting of two cartridges, is attached to the muzzle of the riflle barrel. The cartridges are fired by a firing pin, and ignite a cotton waste stopper saturated with flame thrower fuel.

When the double-action trigger is pulled, the fuel valve is opened and the pressurized fuel is released. At the same time, the cartridge is fired, igniting the cotton waste stopper, which in turn ignites the fuel stream.

A fire extinguisher to extinguish the burning cotton waste after use is attached to the mechanism.

CHARACTERISTICS

Weight (filled)	51 pounds.
Weight (empty)	32 pounds.
Weight of rifle	7.7 pounds.
Length of rifle	3.6 feet.
Capacity of fuel container	2.7 gallons.
Normal fuel load	2.6 gallons.
Normal pressure in fuel container.	206 to 235 pounds/sq. in.
Number bursts per filling (1 second per burst).	6 to 8.
Continuous burst	5 to 6 seconds.
Range	33 to 40 yards.

Section VII. MISCELLANEOUS ENGINEER EQUIPMENT

1. HAND COMPASS

The hand compass has two scales. The inner scale runs clockwise and is numbered in units of 15°, with intermediate ticks indicating subdivisions of 3°. The outer scale runs counterclockwise and is divided into units of 500 mils. On this scale, however, the last zero of each number is not shown. Thus, 500 mils is represented by the figure "50." Based on the Soviet 6,000-mil circles, the mark indicating each 500-mil division on the outer scale coincides with each division of 30° on the inner scale. The compass has no hinged cover, as do the United States lensatic compasses. The method of operation and general construction are similar, however. The magnetic needle is attached to an agate bearing. When not in use, the needle is raised from its post by means of a spring. The north tip of the needle is luminous. The glass compass box cover rotates, permitting sighting in any direction.

Azimuth is determined in the following manner: the box cover is rotated until the triangle luminous indicator coincides with the north triangle. The needle is released, and the operator sights on the object to which the azimuth is desired. The azimuth then is raised in degrees or in mils from the north tip of the needle.

2. MECHANICAL EQUIPMENT

a. Engineer mobile work shop. The mobile work shop (APRIM) (fig. 264) is mounted on a ZIS–5 truck chassis and weighs approximately 5.3 tons loaded. It has a crew of seven. The equipment and instruments are as follows:

Stationary equipment:

- Turret threading lathe, SP–162.
- Carpenters vise with two parallel jaws and electric drill stand (fig. 265).
- Electric grinder (fig. 266).
- Chest of forging instruments.
- Chest of welding instruments.
- Heating apparatus.

Portable equipment:

- Electric generating set, AL–6/2 (fig. 267).
- Gas generator, RA, capacity 265 gallons per hour.
- Oxygen tank and accessories (reducer, etc.).
- Forge with mechanical drive (fig. 268).
- Anvil on a metal support (fig. 268).

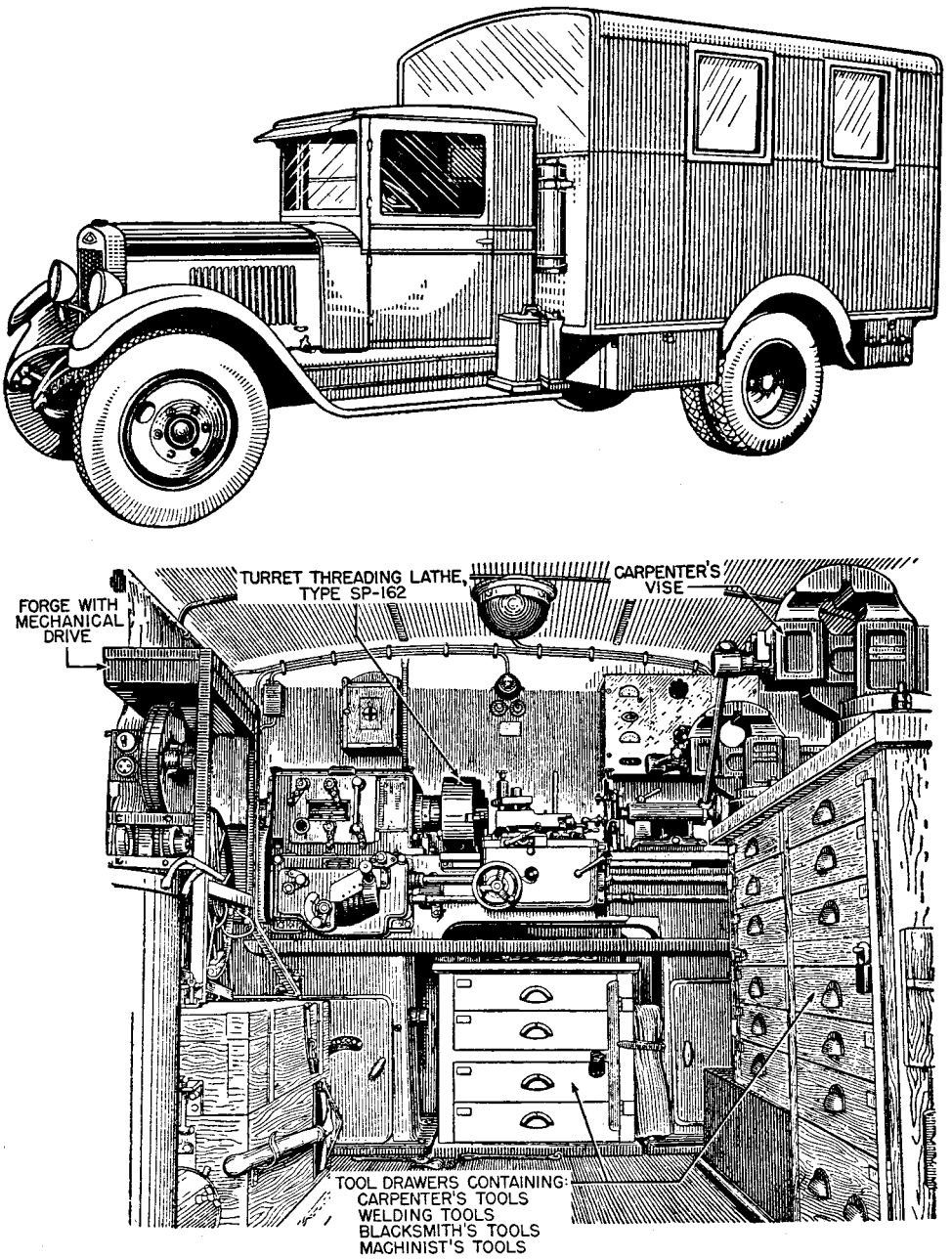


Figure 264. APRIM mobile work shop.

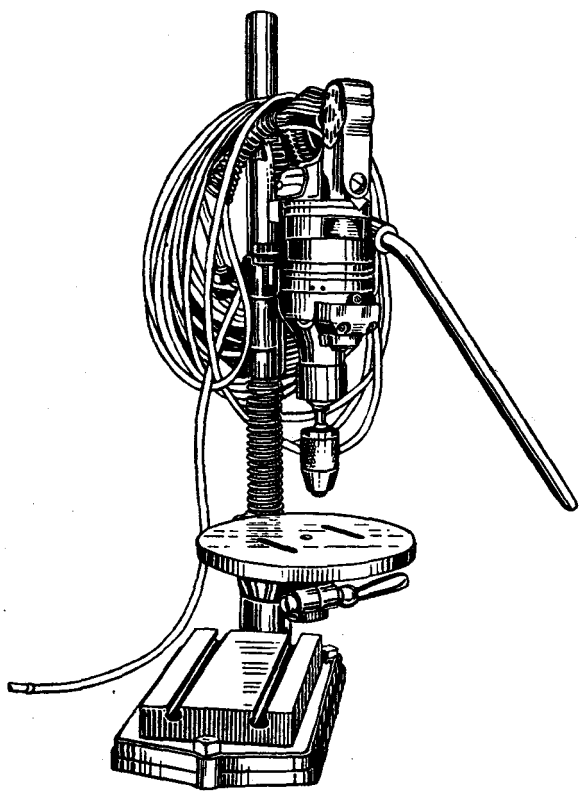


Figure 265. Electric drill with stand.

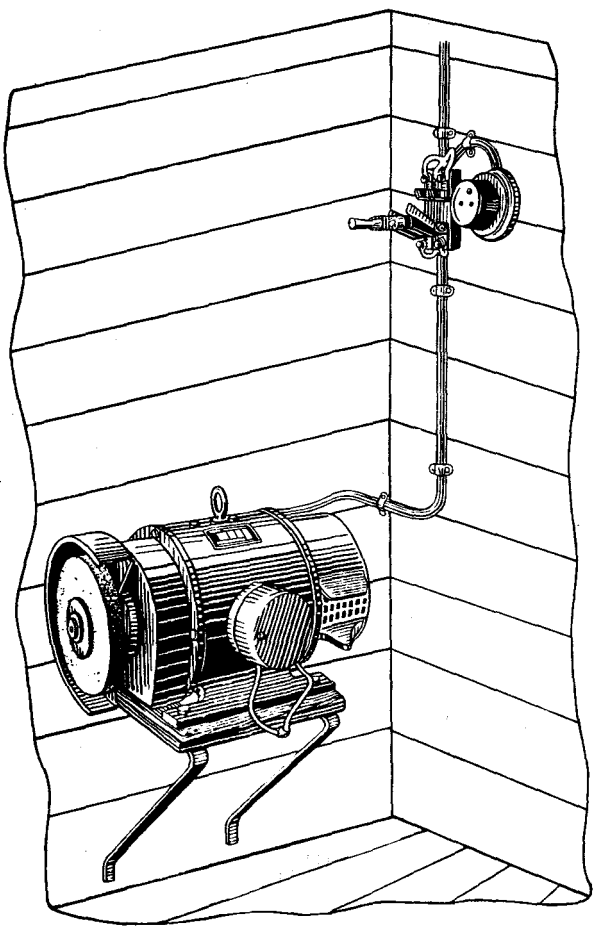


Figure 266. Electric grinder.

727212°—47——13

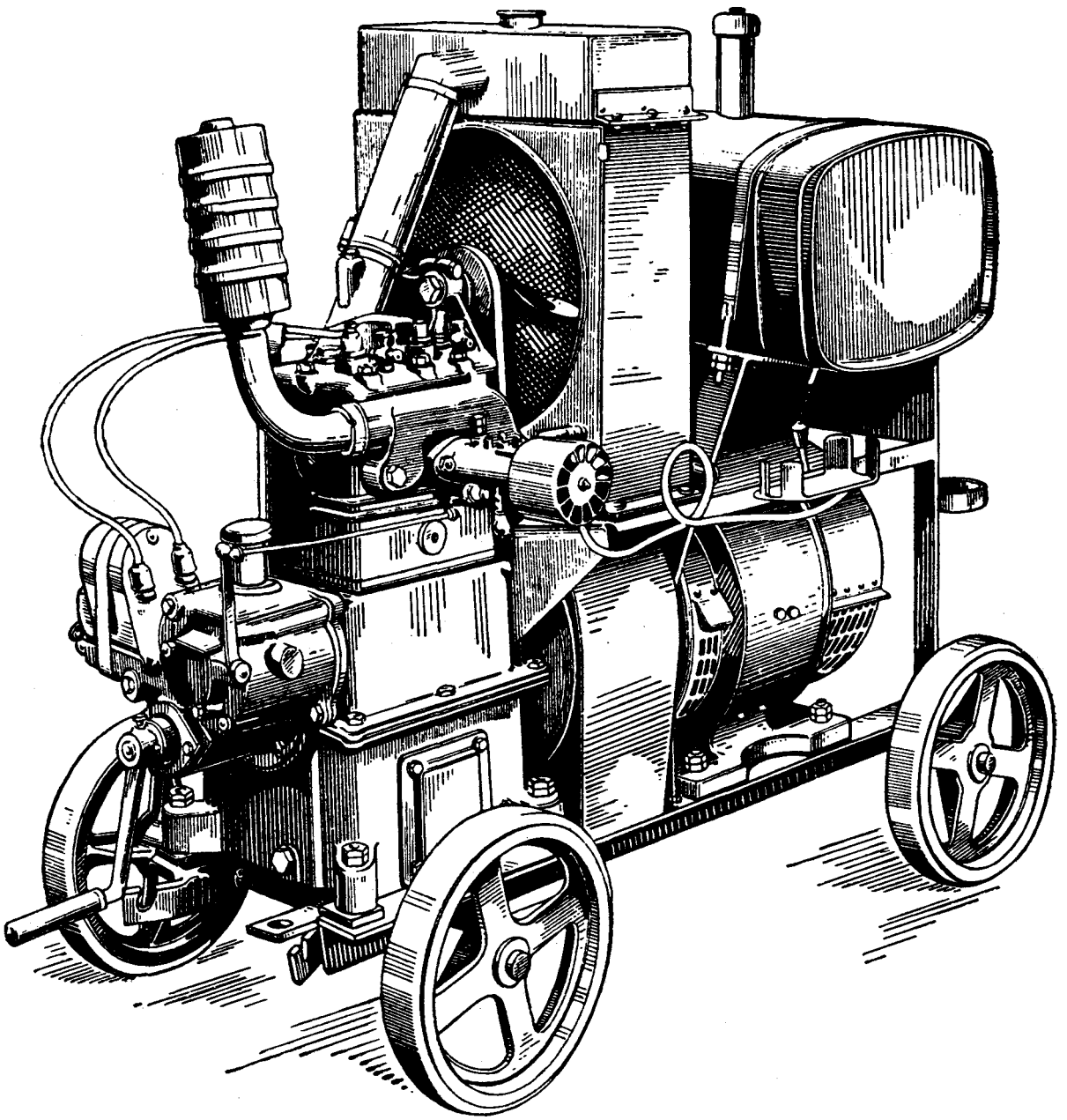


Figure 267. Electric generating set AL–6/2.

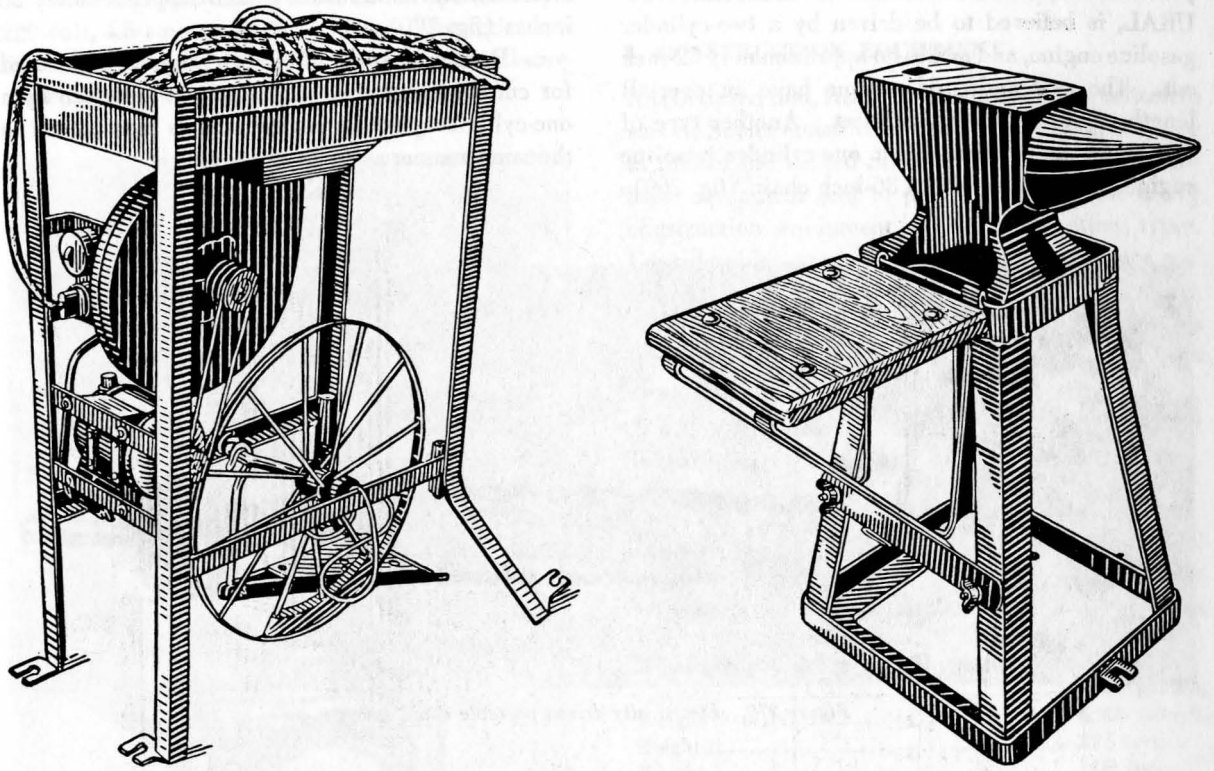


Figure 268. Forge with mechanical drive (left) and anvil on metal support (right).

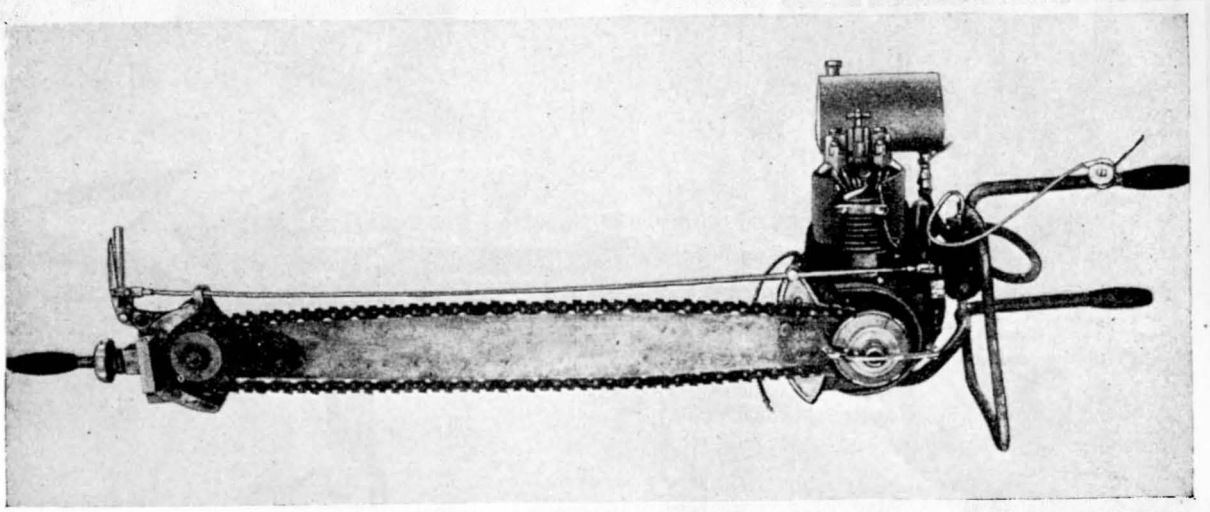


Figure 269. One-cylinder portable chain saw.

b. Portable chain saws. Several versions of portable chain saws are in use. One, the NSU URAL, is believed to be driven by a two-cylinder gasoline engine, and makes an approximately 32-inch cut. The saw and guide frame have an over-all length of approximately 5.5 feet. Another type of chain saw is powered by a one-cylinder gasoline engine and is fitted with a 36-inch chain (fig. 269). Another type is powered by a 220-volt, 6-ampere electric motor, and makes a cut of approximately 20 inches (fig. 270).

c. Portable saw. This saw (fig. 271) is used for cutting metal rods or sheets. It is driven by a one-cylinder gasoline engine, and is transported in the same manner as a wheelbarrow.

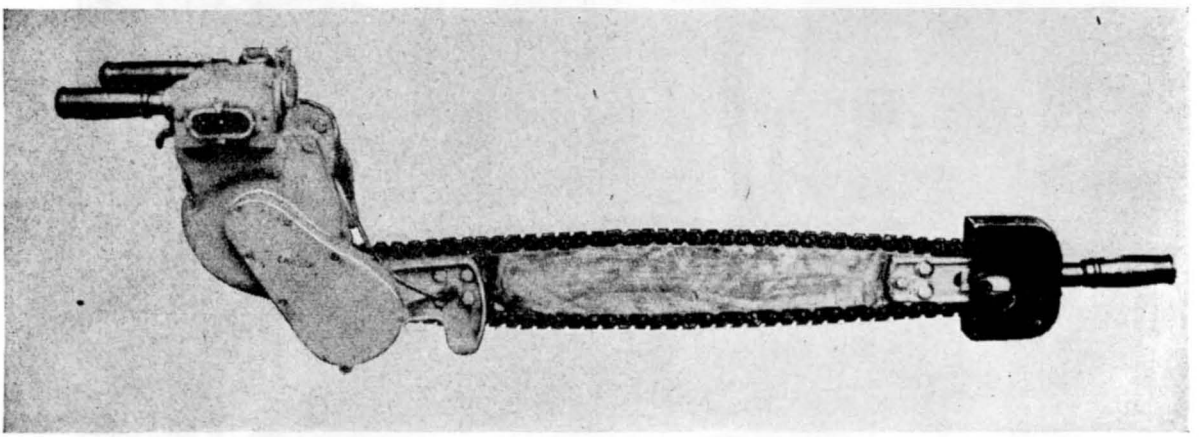


Figure 270. Electrically driven portable chain saw.

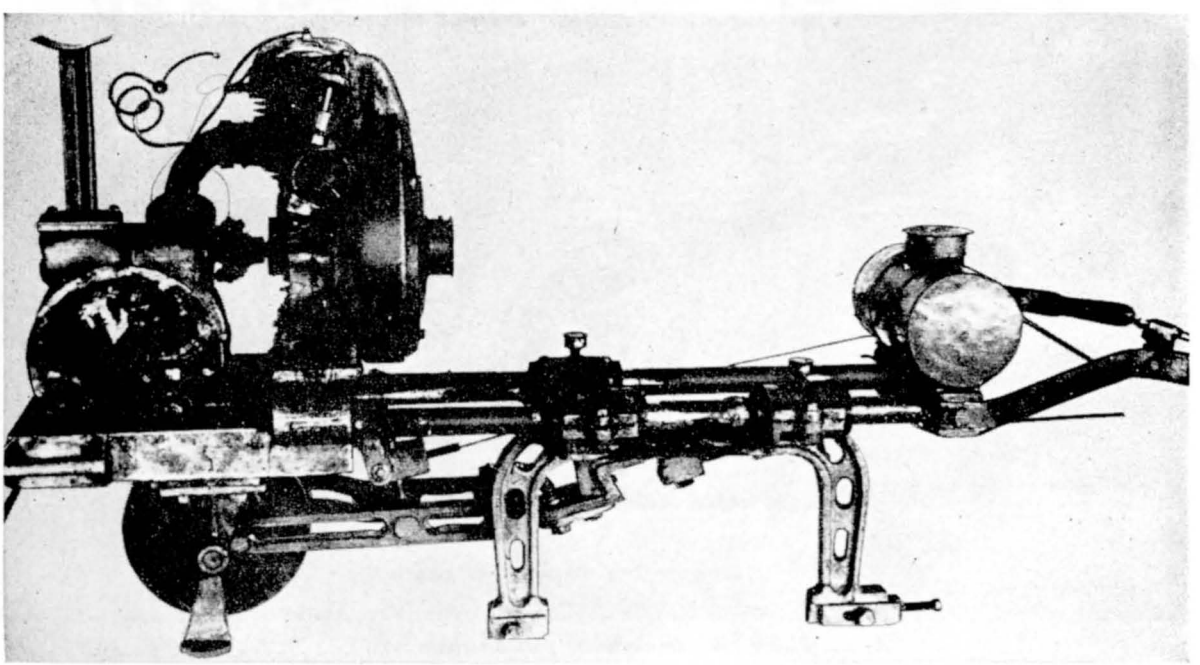


Figure 271. Portable metal saw.

d. Electric band saw. This saw (fig. 272) is 40 inches high, 12 inches wide, and is operated by a 220-volt, 4.5-ampere electric motor. The entire saw fits into a carrying box, from which it may be removed and mounted readily.

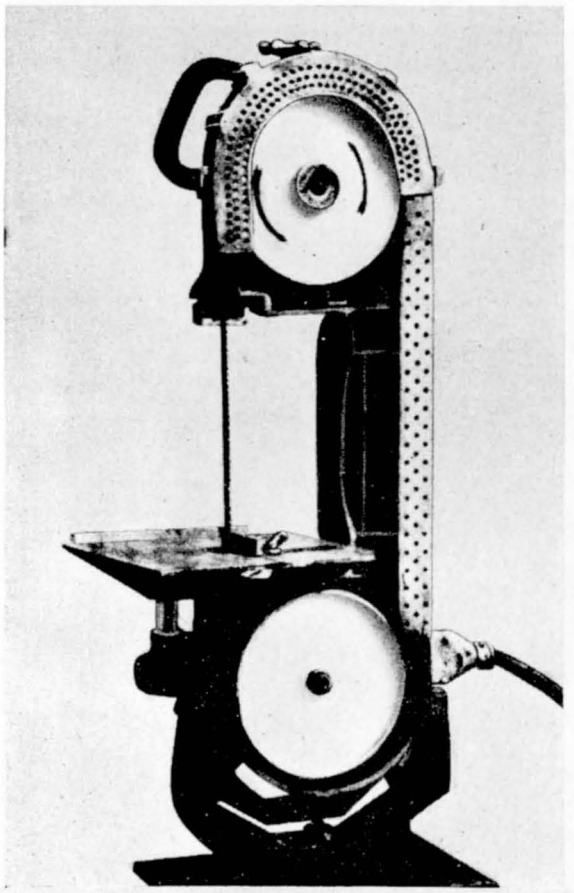


Figure 272. Electric band saw.

e. Portable electric generator. This generator (fig. 273) is operated by a water-cooled, one-cylinder gasoline engine and has an output of from 120 to 130 volts. The generator probably is equivalent to the United States 1.5-kilowatt generator. Four steel wheels are fitted for mobility.

3. CONSTRUCTION EQUIPMENT

It is believed that, from a quantitative and qualitative aspect, Soviet construction equipment is far inferior to that of the United States. Of the engineer lend-lease equipment sent to the U. S. S. R., the heavy construction equipment exceeded all other types. Considerable quantities of crawler-type cranes and shovels, road graders, both motorized and towed, rollers, crushing and screening plants, bituminous distributors, and truck- or skid-mounted compressors were delivered to the Soviets.

a. M–2A pile driver. The M–2A (fig. 274) is transported by two ZIS–6 trucks or 2 trailers.

CHARACTERISTICS

Height of crown	24 feet.
Weight of hammer	1,540 pounds.
Weight of pile (maximum)	770 pounds.
Weight of pile driver (without hammer or winch)	5,060 pounds.
Weight (total)	6,908 pounds.
Height	27.5 feet.
Width	14.8 feet.
Length	12.5 feet.

b. Heavy type road grader. This grader (fig. 275) is used for road and airfield construction projects. The grader has levers for controlling the inclination of the front and rear wheels and for controlling the tread of the rear wheels. There also are levers for lateral movement of the blade, raising and lowering the blade, and a pedal for controlling the lateral position of the blade. In addition there is a blade-angle adjustment. The grader is equipped with shock absorbers. The drive shaft, through connecting rods, is used for inclining the wheels and turning the grader.

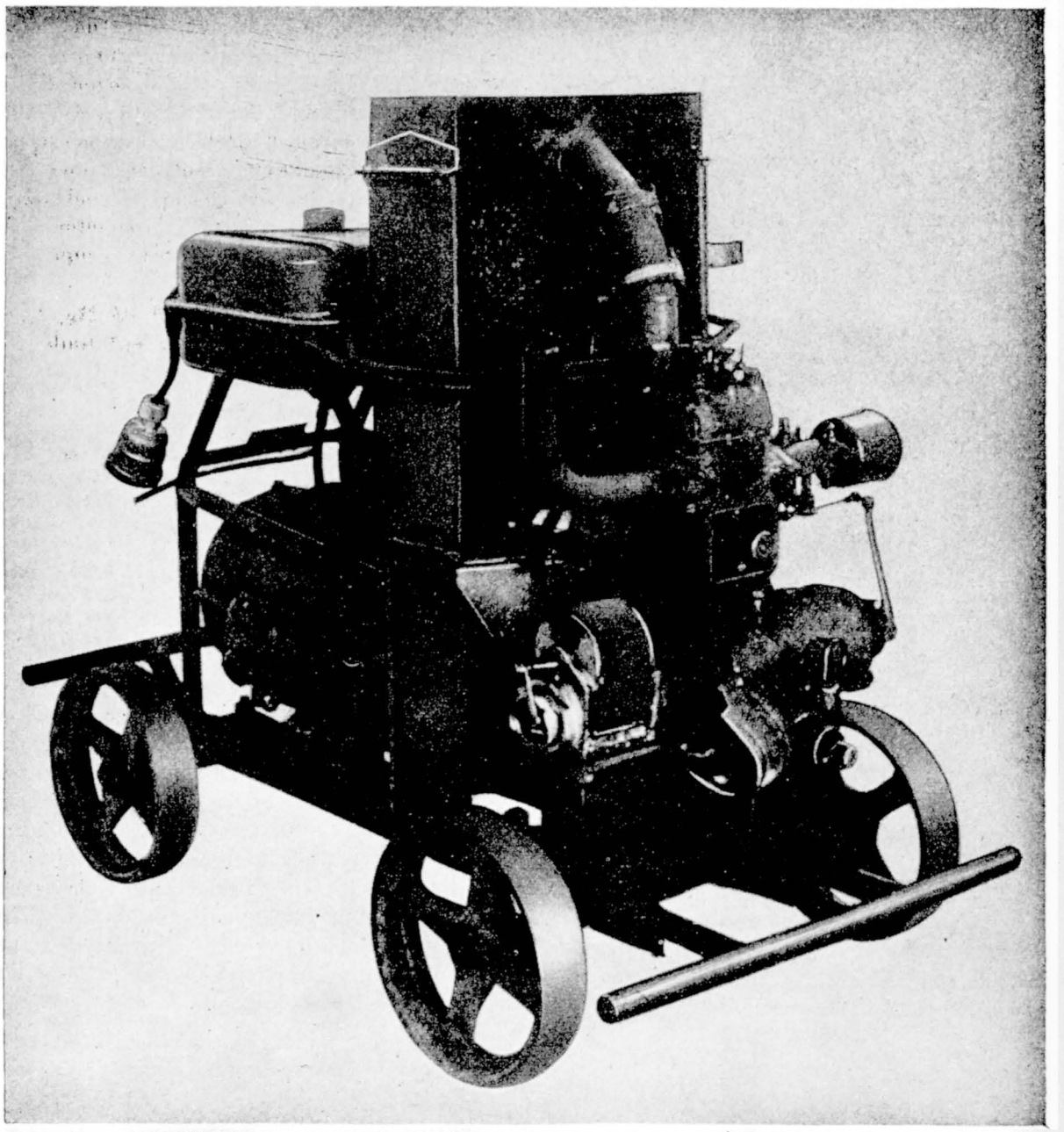


Figure 273. Portable electric generator.

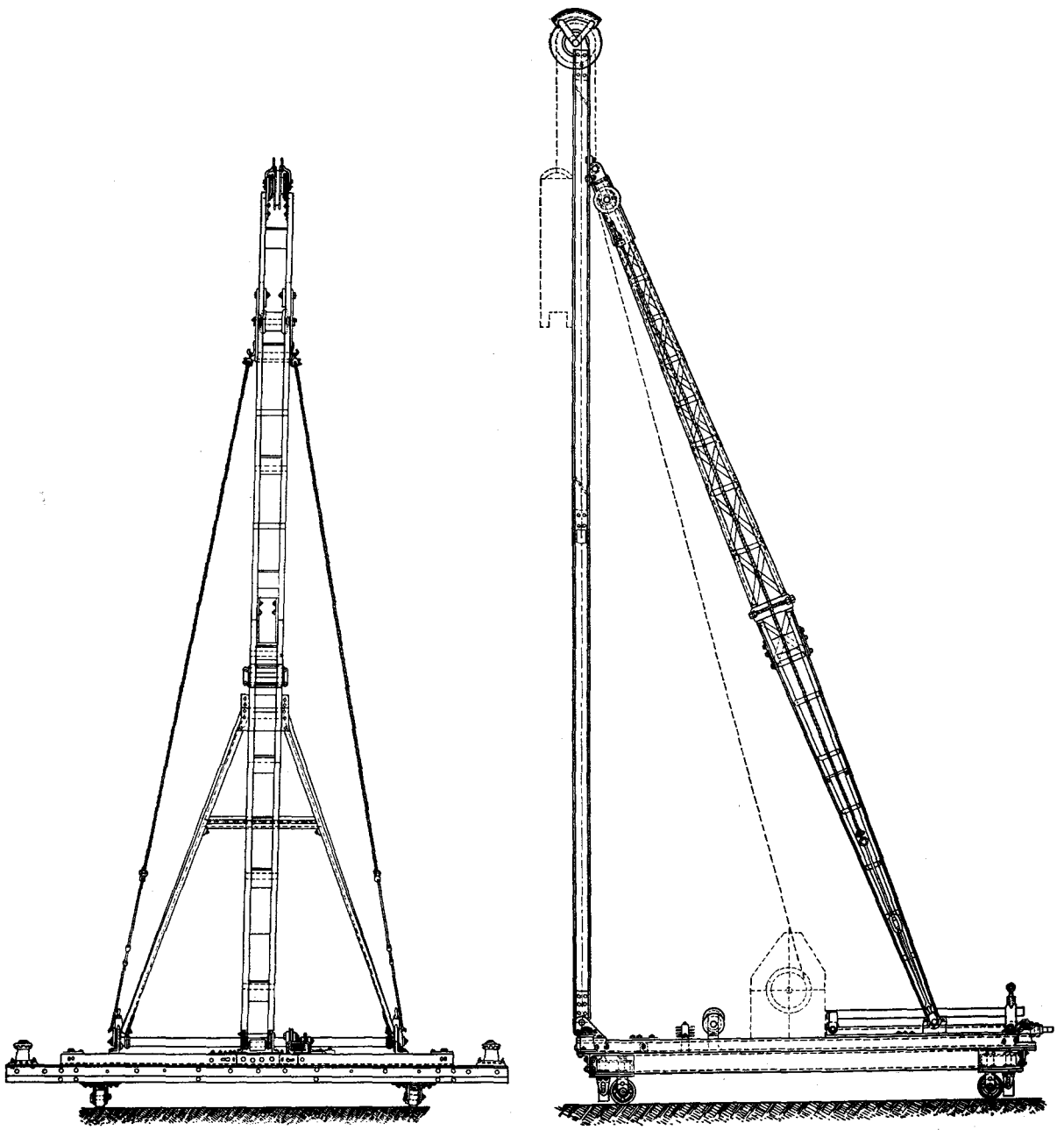


Figure 274. M–2A pile driver.

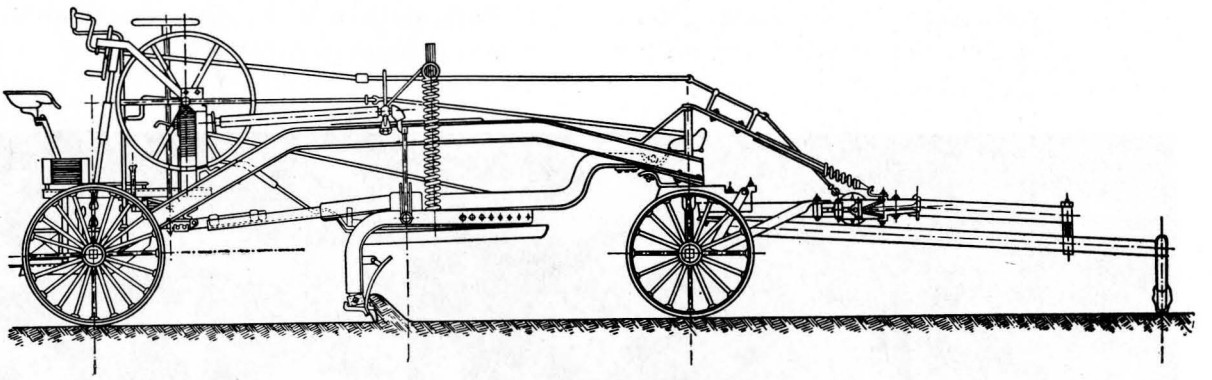


Figure 275. Heavy type road grader.

c. Towed sheepsfoot road-roller (snow). As with the United States sheepsfoot rollers, any number of drum combinations may be employed. The feet appear to be shorter than those used in rollers of United States origin (fig. 276).

4. PNEUMATIC EQUIPMENT

Included in this equipment are all types of pneumatic hammers, riveters, rock drills, wood-boring drills, paving breakers, and chain or circular saws. Such attachments as tampers, spades, moil points, chisels, drills, and bits also have been included. It is believed that the Red Army is well provided with items of this nature, which show but negligible difference from their United States counterparts.

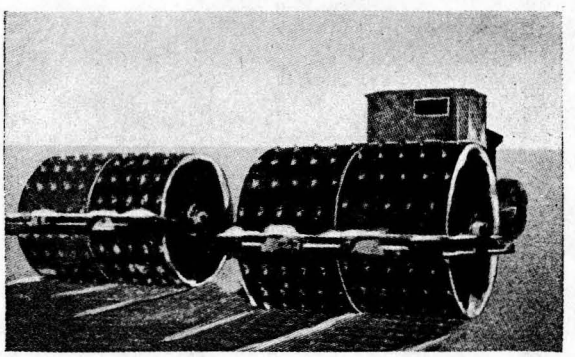


Figure 276. Towed sheepsfoot road-roller.

a. Pneumatic hammers. There are two types of these hammers, the light RB–45 and the heavy RB–63 (fig. 277). Each hammer has an air consumption of approximately 19 to 21 cubic feet per minute.

The RB–45 is used for light hammering or chiseling, and is capable of approximately 2,500 impacts per minute. It is 10.2 inches long and weighs 9.9 pounds.

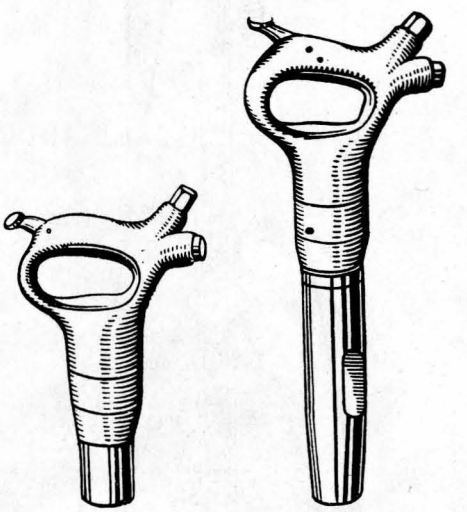


Figure 277. Pneumatic hammers RB–45 (left) and RB–63 (right).

The RB–63 is used for heavy chiseling and riveting up to 0.5 inch in diameter. It weighs 13.8 pounds and is 16.1 inches long.

b. Pneumatic rock drills. There are two models of rock drills of which the BM–13 (fig. 278), weighing 38.5 pounds and measuring 19.5 inches long, is in general use by the Red Army engineers. This drill has an automatic rotor and is capable of drilling a hole from 12 to 13 feet deep. The BM–17

(fig. 279) is approximately the same as the BM–13, with the exception that it is slightly longer and that its shape is slightly different.

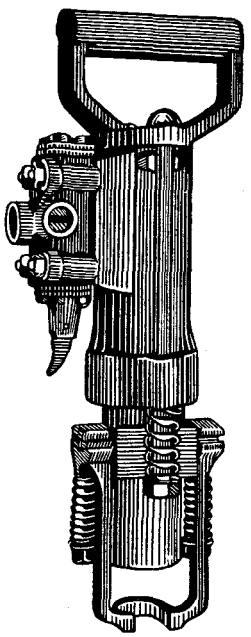


Figure 278. BM–13 pneumatic rock drill.

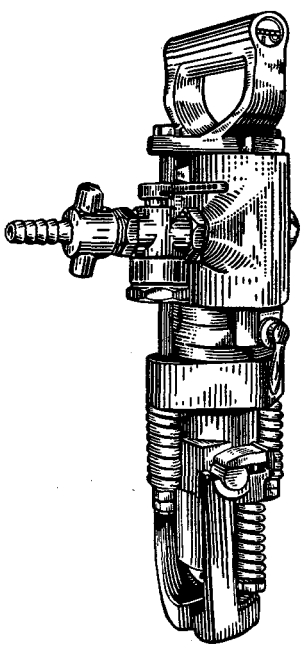


Figure 279. BM–17 pneumatic rock drill.

c. Pneumatic riveters. There are five models of riveters in general use (figs. 280 and 281).

Model	Over-all length (inches)	Weight (pounds)	Air consumption (cubic feet per minute)	Type of hammer for rivets (in inches)	Number of impacts per minute (approximate
KM–31	12.2	17.6	38.8	0.2 to 0.6	1,700
KM–32	14.1	19.8	38.8	0.6 to 0.7	1,400
KM–33	16.1	20.9	38.8	0.7 to 0.8	1,200
KM–34	18.1	24.2	38.8	0.8 to 1.1	900
KM–35	20	26.4	38.8	1.1 to 1.2	800

Figure 280. Characteristics of pneumatic riveters.

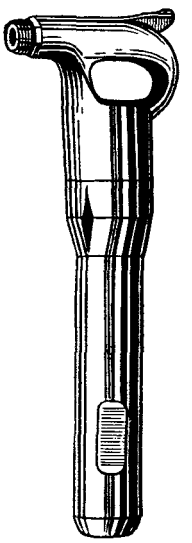


Figure 281. Pneumatic riveters types KM–31 and KM–35.

d. Pneumatic jack hammers. Two models, ZI–4 (fig. 82) and ZI–6, are in general use by the Red Army engineers.

The ZI–4 is 26.3 inches long and weighs 18.9 pounds. It has a drill diameter of 1.2 inches and an air consumption of 35.31 cubic feet per minute.

The ZI–6 is similar to the above model, except that it has a slightly smaller rate of air consumption.

5. WATER PURIFICATION EQUIPMENT

The Red Army uses four types of purification equipment, the hand pump, the pack set, the horse-drawn set, and the motorized set. The RE–6000 reservoir (fig. 283) and the TUF–400 filter are used with all types of purification equipment.

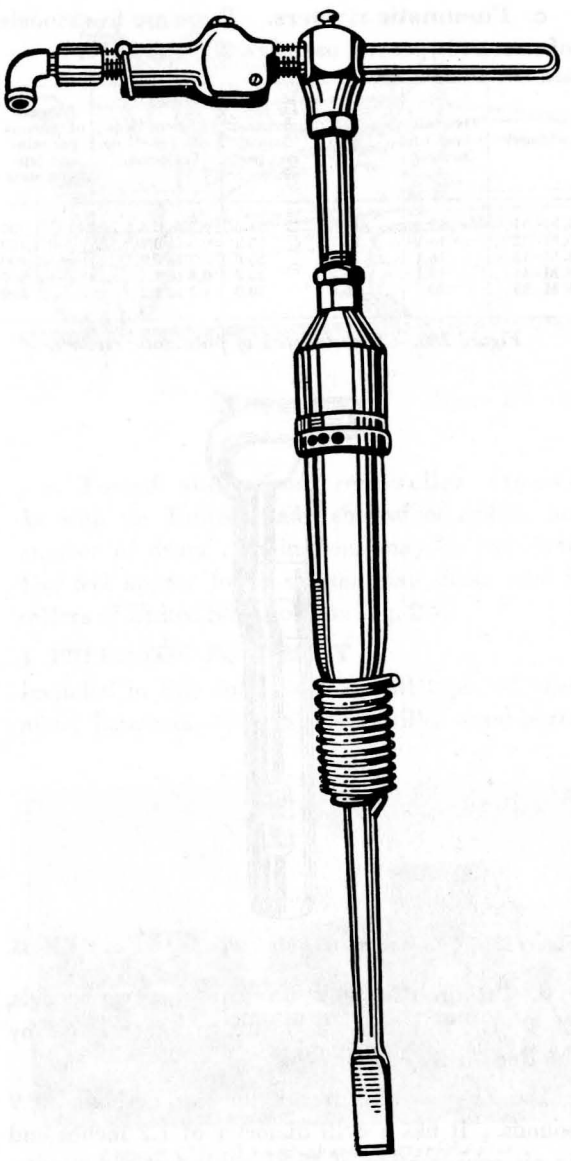


Figure 282. Pneumatic jack hammer ZI–4.

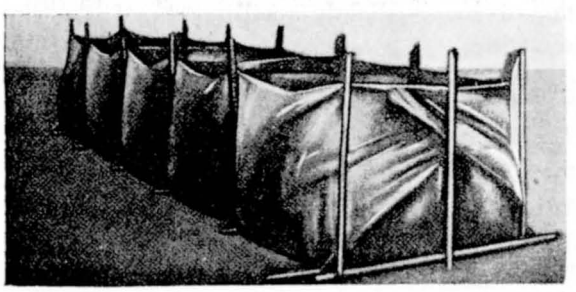


Figure 283. RE–6000 reservoir.

a. KF–4 hand pump. The KF–4 pump (fig. 284) has a capacity of 950 gallons per hour and weighs 61.5 pounds. It has an intake and discharge diameter of 1.5 inches and has a lift head of 20 feet and a draw head of 100 feet.

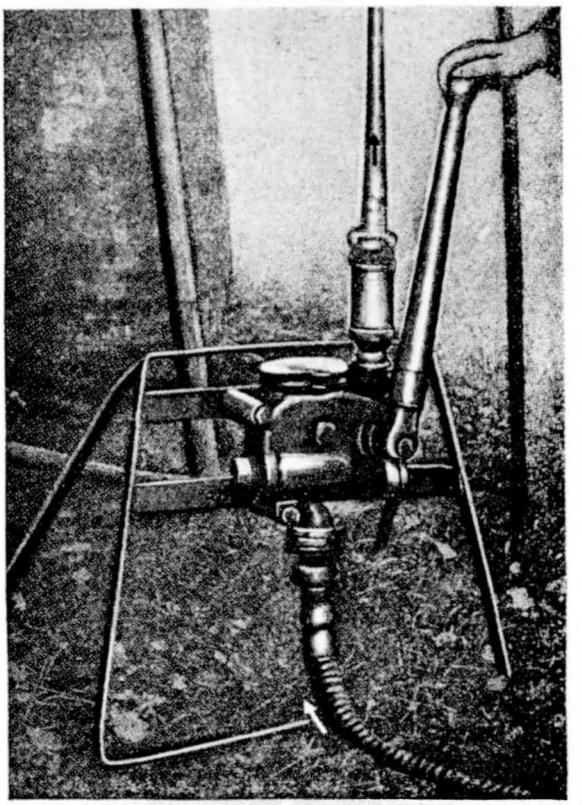


Figure 284. KF–4 hand pump.

The pump is used in conjunction with a charcoal filled canvas filter TUF–400, which has a purifying capacity of 262.5 gallons per hour. The water point usually is manned by four men in 3-hour shifts. The water is stored in a RE–6000 reservoir, where it is sedimented and chlorinated. After 2 hours, the water is pumped into another reservoir.

b. Pack purification set. The pack purification set (figs. 285 and 286) has a capacity of from 53 to 79 gallons per hour and weighs approximately 154 pounds.

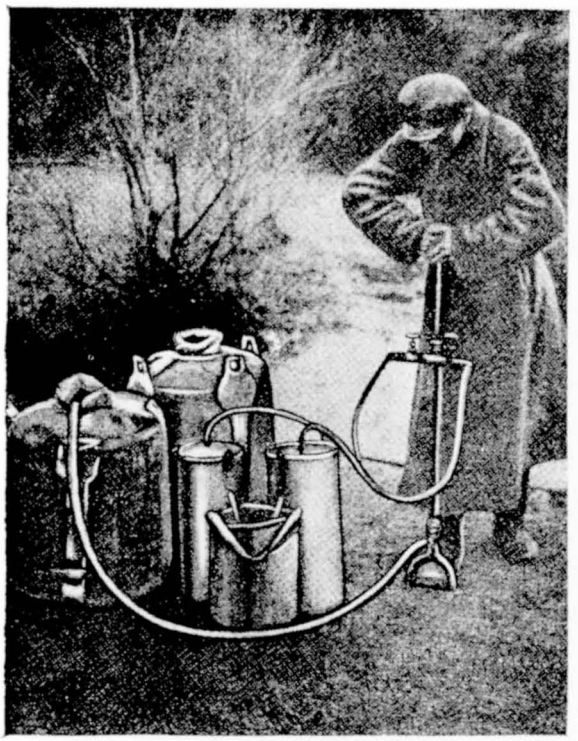


Figure 285. Pack purification set in operation.

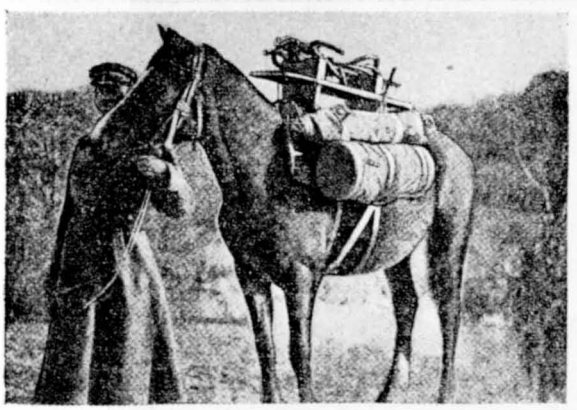


Figure 286. Pack purification set in pack load.

c. Horse-drawn set. This set (fig. 287) has a 135-gallon-per-hour capacity and weighs approximately 1,100 pounds.

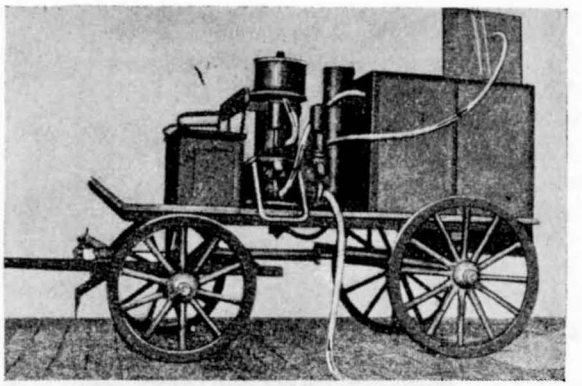


Figure 287. Horse-drawn purification set.

d. Motorized water purification set. This is mounted on the ZIS–5 truck chassis and has a capacity, under one system, of from 530 to 800 gallons per hour and, under another system, from 1,320 to 2,641 gallons per hour. The set consists of the following:

Pressure pump system.
SH–200 pump.
Chemical reagent feed unit.
Contact chamber.
Filter.
Colorimeter unit.
Dechlorinator.
Water testing laboratory set.

The SH–200 pump, powered by the truck motor, makes 400 revolutions per minute. It is capable of pumping 50 gallons per minute, and has a head of 100 feet. The diameter of its intake and discharge is 2.5 inches.

e. UNF–30 universal portable filter. The UNF–30 filter (fig. 288) is intended for purification of water under field conditions, and is carried in a khaki tarpaulin bag. The bag has pockets for spare parts, appliances, and tools. The dimensions of the bag containing the filter are 7.3 by 11.4 by 13.6 inches. The set weighs 16 pounds and is

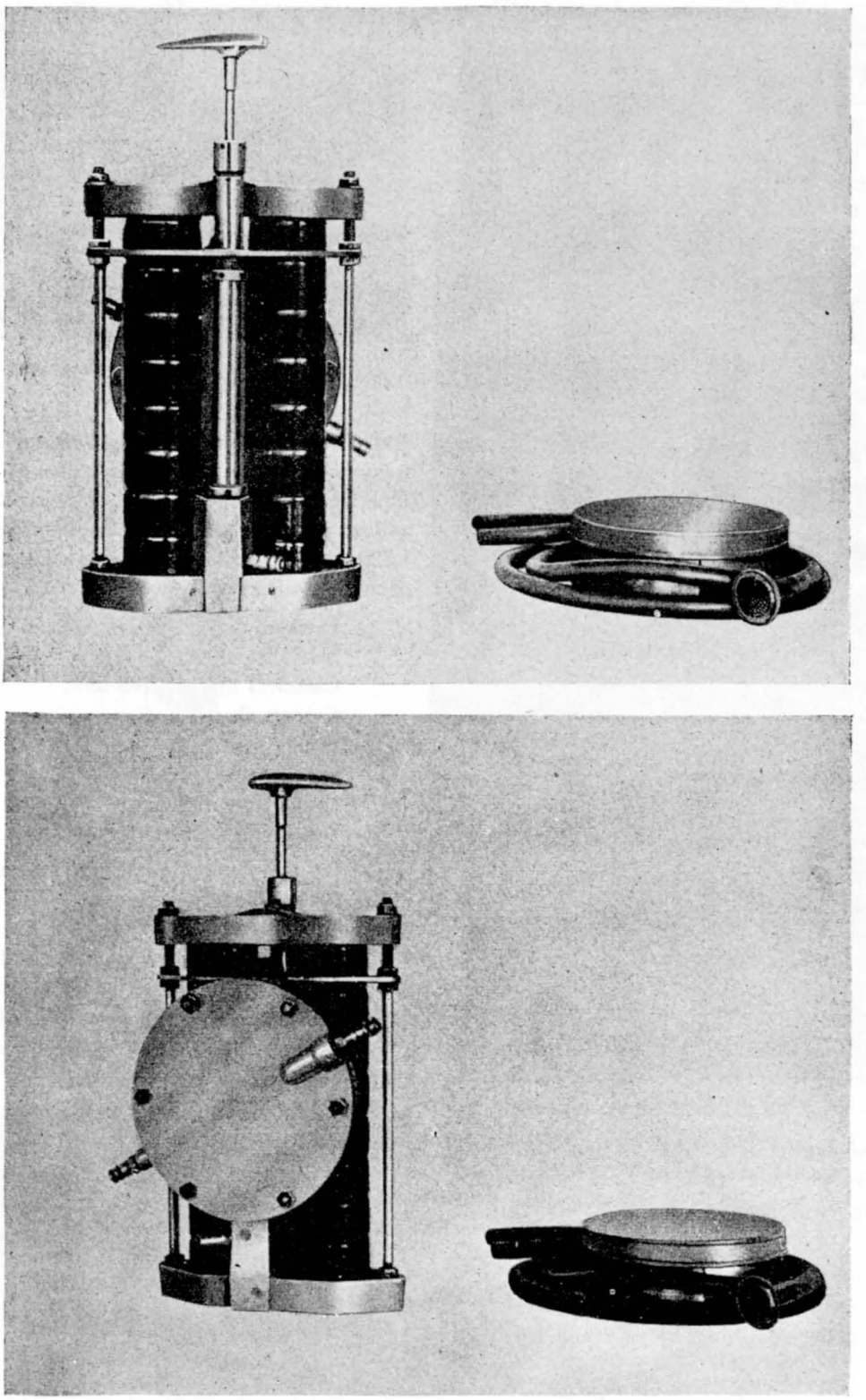


Figure 288. UNF–30 universal portable filter.

capable of purifying 10.5 gallons of water with one carbon charge. An extra charge is carried in the bag. From 3 to 5 minutes are required to obtain the first pure water after assembly of equipment.

6. PROJECTORS

Three types of projectors are known to be in use by the Red Army. Each projector is designed for the enlargement or reduction of photographed negatives only.

a. Field projector. The field projector is comparatively small in size and weighs approximately 220 pounds. The light source is situated at the base of the machine, with the screen on the top.

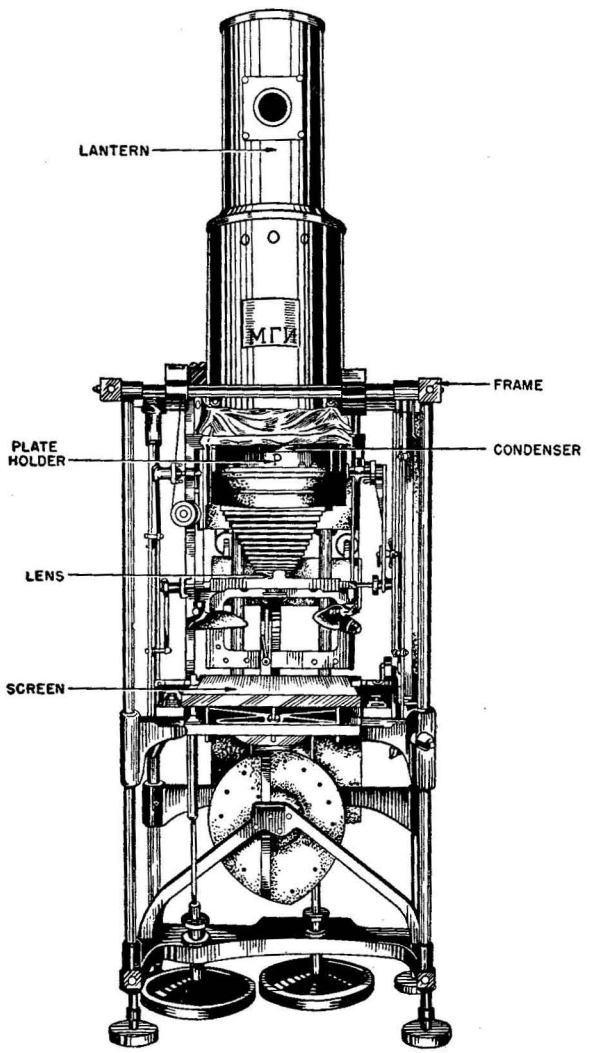


Figure 289. MGI projector.

b. MGI projector. The MGI (fig. 289) appears to be a considerably heavier instrument than the field projector. The light source is at the top.

c. Sokolov projector. The light source of the heavy Sokolov projector is a 1,000-watt lamp, situated at the top of the instrument.

7. SURVEYING INSTRUMENTS

a. Plane table VTO. The VTO appears to be a plane table of conventional design (fig. 290).

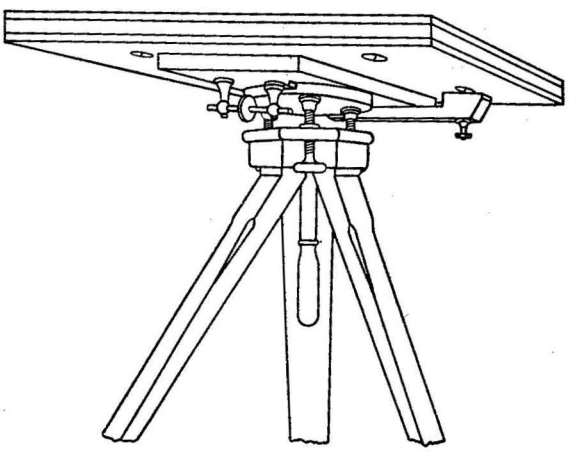


Figure 290. Plane table VTO.

b. Kern compass. This compass, which is used with the VTO plane table, is enclosed in a rectangular box and has an arc of only 20 degrees.

c. Telescopic alidade. The telescopic alidade (fig. 292) is employed as a sighting instrument in conjunction with the VTO plane table. It also serves as a range finder, and measures angular height.

d. KSLV M1932 plane table and telescopic alidade (fig. 293). This plane table consists of a board, measuring 20 x 20 inches, and tripod. A 19-inch straightedge can be screwed to the table if required.

e. Stereocomparator. The stereocomparator is an optic-mechanical instrument for the accurate measurement of coordinates on a negative.

The instrument consists of a fixed frame with longitudinal guide rails, on which the main carriage is moved by means of a steering wheel. The

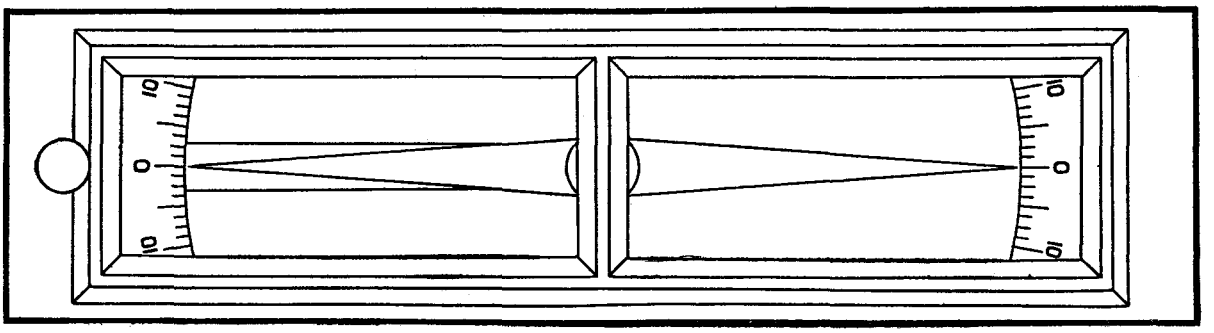


Figure 291. Kern compass used with plane table VTO.

carriage has two frames with frosted glass, in which pairs of negatives may be fastened. In the upper central part of the fixed frame is a bridge, with traverse guide rails on which the upper optic part is moved by means of a steering wheel. The upper optic part corresponds to an 8-power binocular microscope.

f. Wilde-Zeiss theodolite. Topographic reconnaissance batteries employ the Wilde-Zeiss theodolite, which has a horizontal accuracy of 1 minute and a vertical accuracy of 1 mil. It has a magnification of 10 power, a field of observation of 5°, and a light intensity of 25. It is fitted with a detachable periscope. The weight, without tripod, is 13.2 pounds.

g. Askania-Werke theodolite. The Askania-Werke theodolite (photo-transit) is equipped with a motor-operated camera. It consists of a photo-

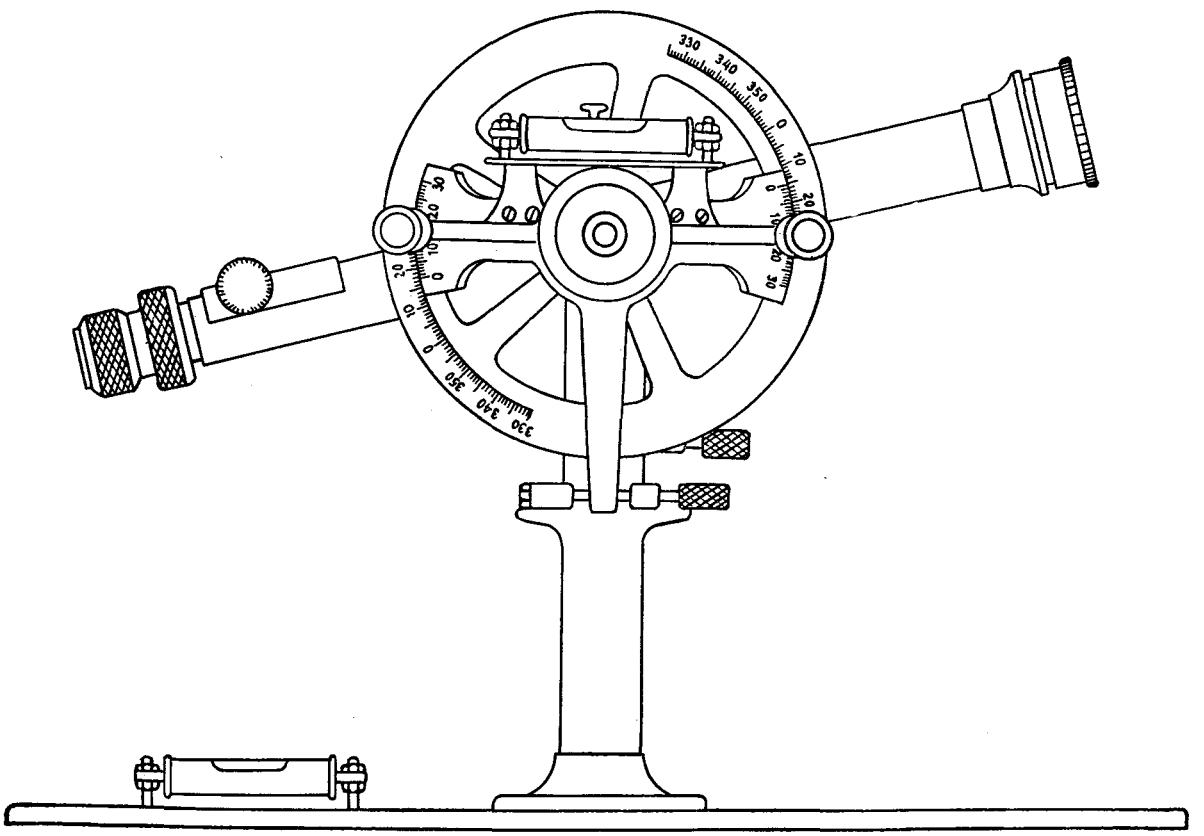


Figure 292. Telescopic alidade.

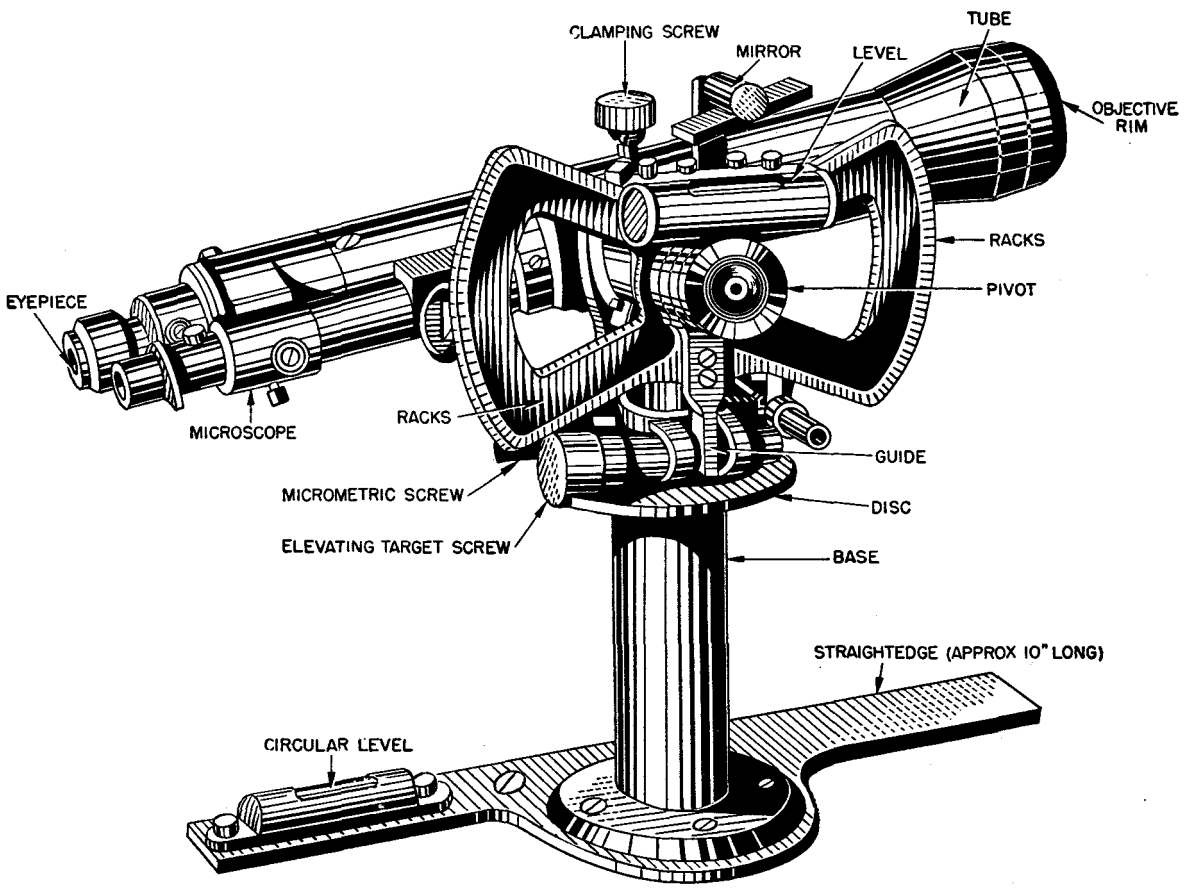


Figure 293. Telescopic alidade KSLV M1932.

telescopic lens, and two optical sights for aiming. These theodolites are used in pairs. The distance between them is measured carefully, and the electric system, which controls the making of pictures, is controlled centrally so that pictures are taken simultaneously. Each instrument is operated by one observer. The controlling station is equipped with recording chronograph.

CHARACTERISTICS

Focal length	23.6 inches.
Field of view on photo plate	2°.
Magnification (2 settings)	6 × and 12 ×.
Field of view from visual scope	3°30′ (at 12 ×).

h. TA theodolite set. This set consists of the theodolite TA, with attached compass, two sighting targets, four sliding tripods, 2- to 10-foot range finding stadia rods, four boxes with storage batteries, four T-junction boxes with cables, two pin plugs and pencil illuminators, and four tripods with optical centering devices.

i. TA theodolite. The TA theodolite (fig. 294) consists of the following parts:

1. Vertical scale.
2. Optical control device.
3. Supports.
4. Mirrors.
5. Elevating screws.
6. Hole for fastening screw.
7. Optical centering.
8. Focusing ring.
9. Adjustable eyepiece.
10. Clamping screw.
11. Tripod.
12. Horizontal adjustment screw.
13. Horizontal azimuth circle.
14. Vertical adjustment screw.

15. Catch.
16. Adjustable eyepiece.
17. Focusing ring.
18. Reading eyepiece.
19. Vernier knob.
20. Vertical scale clamping screw.
21. Telescope.
22. Screw for horizontalization of the vertical scale alidade.

j. TT–2 theodolite. The TT–2 (fig. 295) measures horizontal and vertical angles, with an accuracy to 30 seconds, and is used with the stadia rod to measure distances.

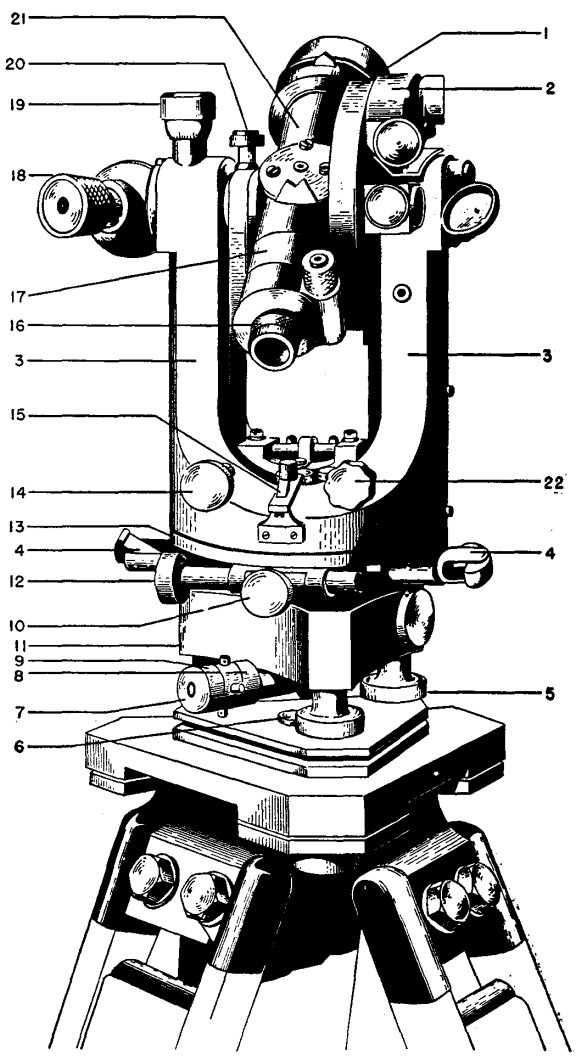


Figure 294. TA theodolite.

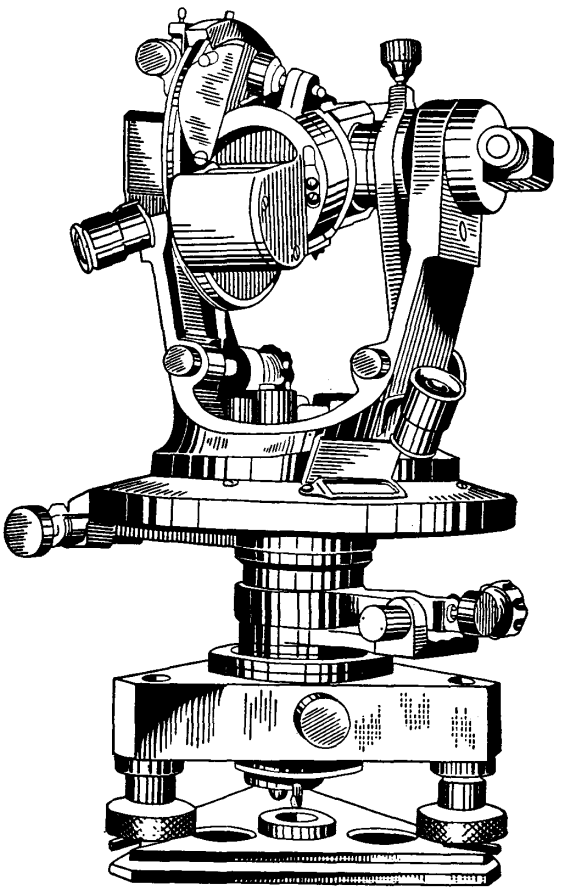


Figure 295. TT–2 theodolite.

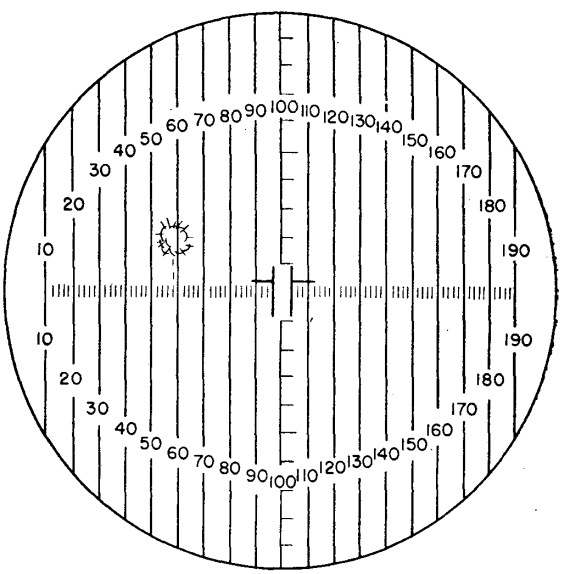


Figure 296. Special reticle for TS–2 theodolite.

It has a detachable periscope, permitting the measurement of angles from behind cover. In addition, there is a zenith prism for measuring angles greater than 45°, an attachable compass for orienting according to the magnetic meridian, and an illuminating device for night work. The construction is very similar to that of the TA theodolite.

k. TS–2 theodolite. This instrument is similar in construction and operation to other theodolites, but is used principally for the correction of artillery fire and for the accurate location of targets, especially when air bursts are used. A special reticle (fig. 296) is used for air burst spotting. The field of view in this reticle is divided into 20 vertical strips, which are numbered from left to right from 0 to 200. Each strip is subdivided further along the horizontal axis into five parts. The value of the smallest subdivision is 2 minutes of arc. The vertical axis is divided into 20 parts. This recticle may be turned 180° so that either vertical or horizontal adjustments may be made.

The TS–2 is equipped with two extra eyepieces. One rectifies the image, and the other is for use with gas masks. The periscope of the theodolite may be extended to a height of 15.7 inches, permitting use of the instrument in defilade positions.

PART V. CHEMICAL WARFARE EQUIPMENT

Section I. GENERAL

1. STATE OF PREPARATION

The U. S. S. R., probably more than any other great power, always has emphasized the great potentialities of chemical weapons in modern warfare. Therefore, it is probable that its armed forces are provided with adequate means of conducting both offensive and defensive chemical warfare operations on a large scale.

The diversified nature of the war gases likely to be on hand may be gauged approximately from the design of the gas detection equipment, which is adapted for phosgene, arsine, hydrocyanic acid, cyanogen chloride, mustard gas, lewisite, nitrogen mustard, chloracetophenone, and adamsite.

2. EQUIPMENT

Weapons used for the dissemination of war gases are known to include, in addition to chemical projectiles and aerial bombs, several models of special gravity-operated aircraft spray tanks. These tanks are reported to constitute a highly effective means for laying down heavy concentrations of nonpersistent gases in a minimum of time. The Soviets also possess an armored vehicle said to be adapted for ground contamination, for dissemination of smoke, or for flame projection. It has been reported that, at one time, this chemical equipment was mounted on the chassis of the now obsolete T–26 tank. It is likely that armored vehicles of more recent types have been outfitted with similar or with improved multiple-purpose chemical warfare equipment.

Soviet protective chemical warfare matériel is of conventional design. It includes both complete sets of impregnated, permeable and impermeable protective clothing.

Section II. DEFENSIVE EQUIPMENT

1. GAS MASKS

The service gas mask BN has a rubber facepiece connected to a box type canister by a stockinette-covered, corrugated rubber hose. There are several models both of the facepiece assembly and of the canister. Gas masks combining various combinations of these interchangeable components are in use.

The Soviets state that, under field conditions, the BN gas mask provides adequate protection against phosgene or chlorine for 16 hours when worn by a man at rest, and for approximately 8 hours under conditions of moderate physical exertion.

The gas mask BN may include any of the following components:

a. Helmet-type facepiece (old model). The helmet type facepiece, made of soft gray rubber,

extends over the scalp and ears, thus ensuring a secure, gastight fit. The old model facepiece of this type (fig. 297), which is now obsolete, has an external outlet valve located at the rear of the angle tube and is characterized by a hornlike extension between, and slightly above, the eyepieces. This extension, a "wiper," can be pushed inside the facepiece with the finger to remove moisture from the lenses.

b. Helmet-type facepiece (new model). The new model (fig. 298) is similar in general appearance to the old model, but is without the "wiper." Also, the outlet valve is enclosed in the angle tube assembly. The facepiece is fitted with deflector tubes to prevent fogging of the lenses.

c. Facepiece O–8. The O–8 facepiece, of conventional design, is made of gray rubber and has a five-strap adjustable head harness with a rubber head pad.

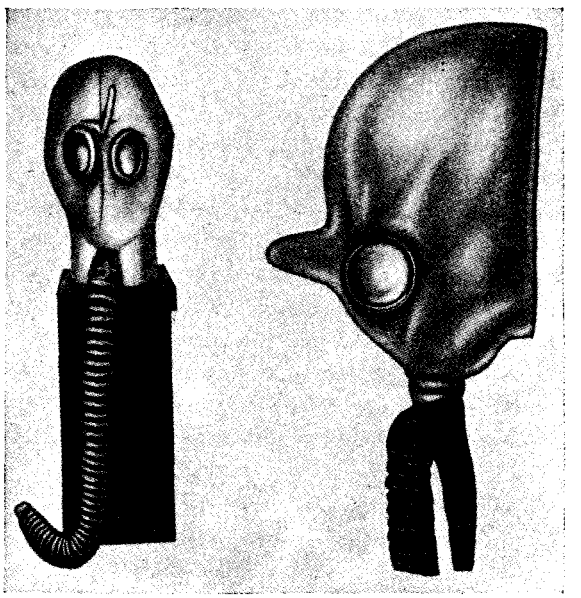


Figure 297. Helmet type facepiece, old model.

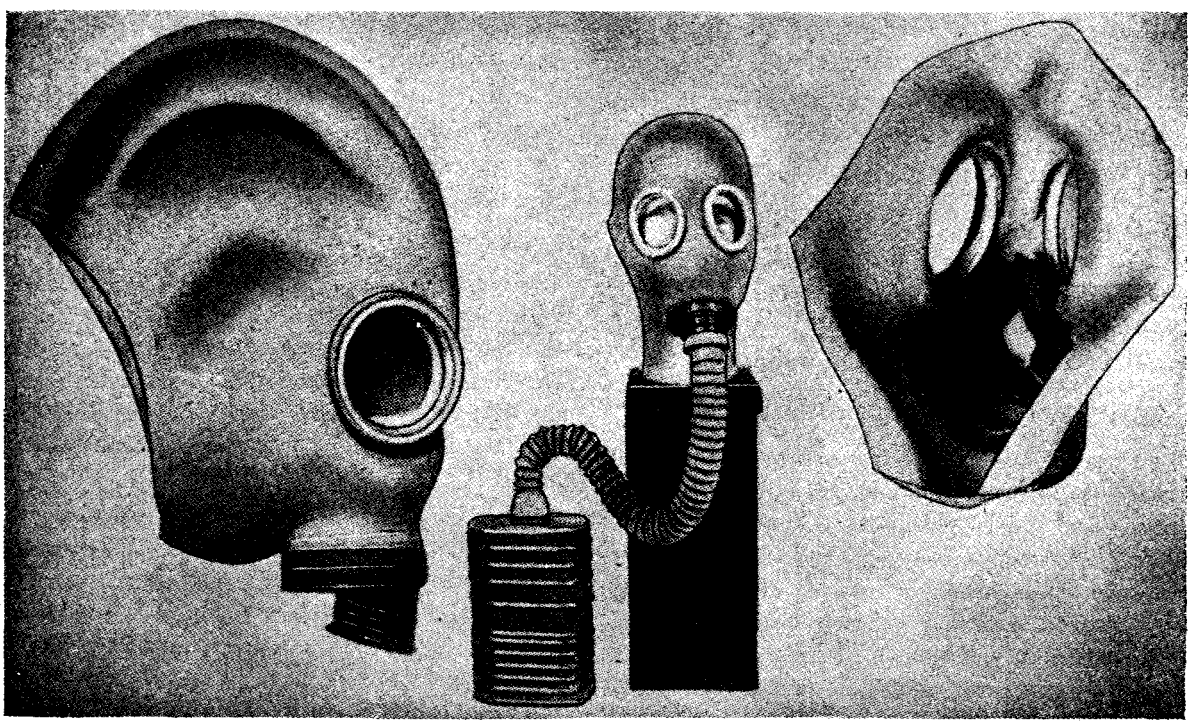


Figure 298. Helmet type facepiece, new model.

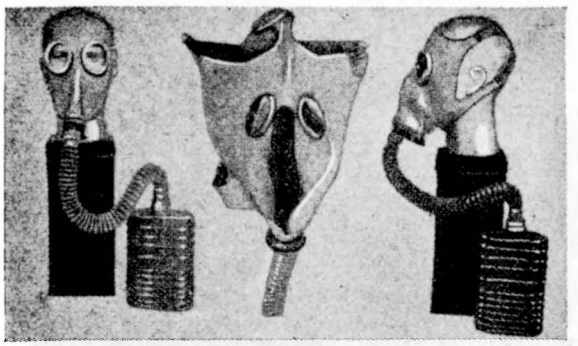


Figure 299. Facepiece MOD–08.

d. Facepiece MOD–08. The MOD–08 (fig. 299) is an improved model of the O–8 facepiece made of heavier rubber and fitted with a deflector tube. The eyepieces are larger than in model O–8 and have antidim disks with retaining rings.

The helmet-type facepieces are made in four sizes and the head harness type facepieces in three sizes.

e. Gas mask canister T–5. The olive green, painted canister T–5 is approximately 9 inches high, 6 inches wide, and 3 inches thick. It has a threaded nozzle and a circular inlet port fitted with a rubber disk inlet valve (fig. 300).

f. Gas mask canister T–Ch. The olive green canister T–Ch (fig. 301) is 8.3 inches high, 6 inches wide, and 3 inches thick. It has a threaded nozzle and perforated bottom.

g. Gas mask canister MT–4. The MT–4 canister (fig. 302) is of the same dimensions as the T–Ch, but has a circular inlet port which can be sealed with a rubber stopper, fastened to a metal loop on the bottom of the canister.

h. BN carrier. The BN (fig. 303) gas mask carrier is a rectangular canvas satchel with adjustable shoulder sling and body strap. Inside pockets are provided for the protective paper cape and for a stick of antidim compound. An outside pocket on the side holds an individual decontamination packet.

i. Headwound gas mask. The headwound gas mask (fig. 304) consists of a sheet-rubber hood with circular eyepieces, corrugated rubber air hose, and tie tapes for securing the hood in position. It may be used with any standard gas mask canister.

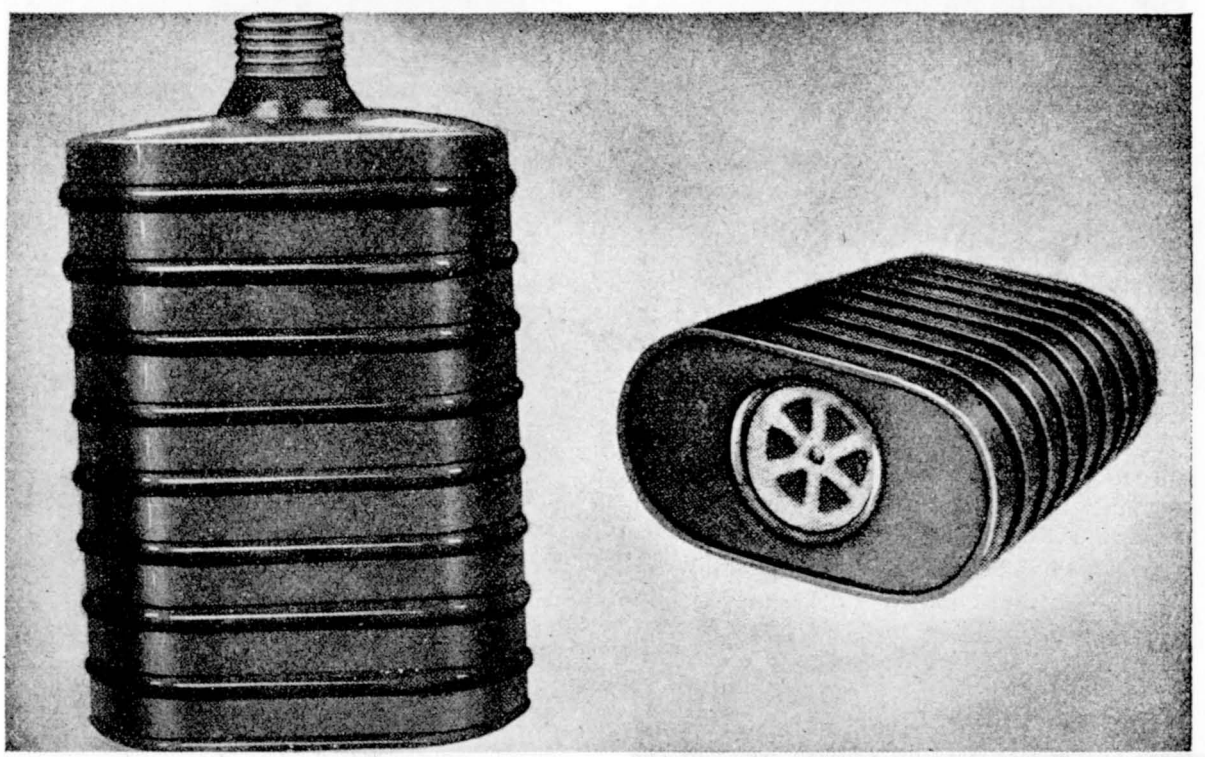


Figure 300. Gas mask canister T–5.

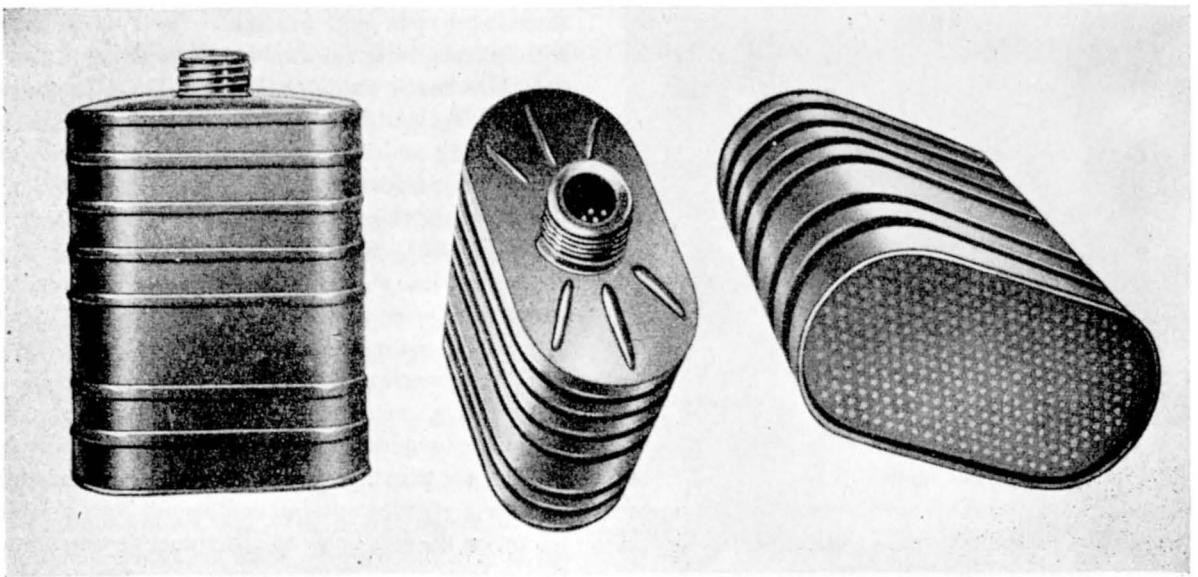


Figure 301. Gas mask canister T–Ch.

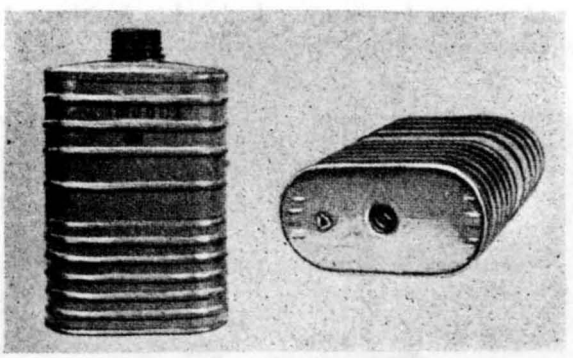


Figure 302. Gas mask canister MT–4.

Figure 303. Gas mask carrier BN and accessories.

j. Oxygen breathing set KIP–5. The oxygen breathing set KIP–5 is designed for use in cellars, dugouts, and other enclosed places lacking adequate aeration or where very high concentrations of war gases are likely to be encountered. The apparatus consists of a gas mask facepiece connected to a container holding a 0.74-quart oxygen flask, an alkali canister, and a breathing bag. Under average conditions, the oxygen supply is sufficient to support normal breathing for approximately 1 hour.

2. IMPERMEABLE PROTECTIVE CLOTHING

a. Oilskin protective suit. Made of a double layer oilskin material, this coverall type suit (fig.

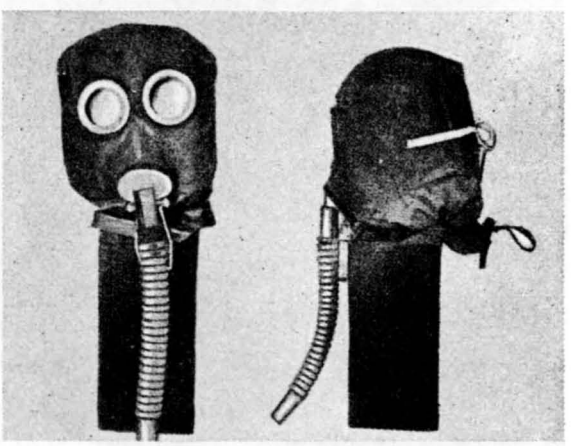


Figure 304. Headwound gas mask.

305) provides protection from liquid blister gases at 95° F. for at least 3 hours, according to Soviet statements. The garment is not suited, however, for use during cold weather because the oilskin fabric becomes brittle at low temperatures.

Figure 305. Oilskin protective suit.

b. Protective clothing SK–01. Made of rubberized fabric, protective clothing SK–01 (fig. 306) is serviceable at temperatures down to −40° F., according to Soviet statements. Two models are in use, one consisting of trousers and jacket with fixed hood, the other of the coverall type. This clothing is said to protect against liquid blister gases for approximately from 40 to 50 minutes at 95° F.

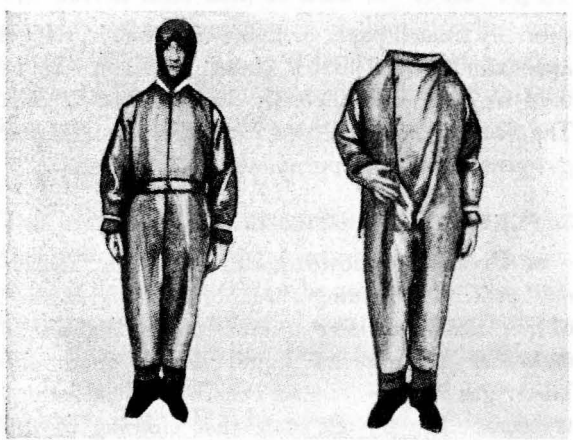


Figure 306. Protective clothing SK–01.

Oilskin or SK–01 protective clothing is worn by troops carrying out large scale ground contamination or decontamination. It also is issued to gas sentries, to command personnel, and to combat engineers engaged in special chemical warfare operations.

Figure 307. Protective apron.

c. Protective aprons. Oilskin or rubberized fabric aprons (fig. 307) and protective gowns with tie-tape fasteners at the back are supplemented if necessary, by protective hoods of the same ma-

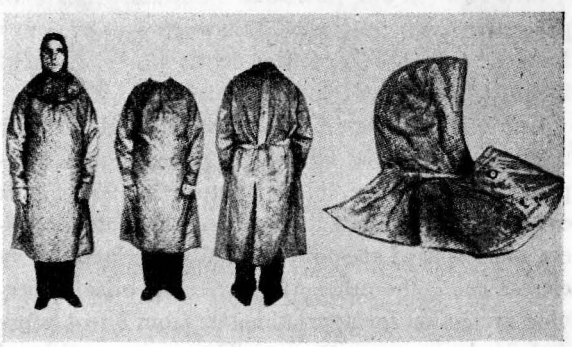


Figure 308. Protectvie apron and hood.

terial (fig. 308). They are worn by troops decontaminating weapons and equipment and by medical and other personnel whose duties entail handling of contaminated objects.

d. Protective gloves and boots. Heavy rubber knee boots and gauntlet gloves are worn in conjunction with impermeable protective clothing by troops carrying out operations involving exposure to liquid blister gases.

e. Protective overboots. Several models of protective overboots (fig. 309), worn over ordinary footgear and held in position by tie straps, are used for crossing contaminated areas.

One model, made of oilskin fabric, is claimed by the Soviets to resist blister gas penetration for approximately 1 hour at temperatures of 95° F. It can be decontaminated after use. Two other models, one made of specially treated fabric with heavy canvas soles, the other of lightweight oilskin, provide protection for approximately from 3 to 4 hours and ½ hour, respectively. These two models of overboots are expendable items and are discarded after use.

f. Protective capes. A protective cape (fig. 310), fitted with a triangular hood and internal pockets which permit the wearer to hold the flaps of the garment in closed position, is used for protection against aerial spray. The cape, made of specially treated paper or lightweight fabric, weighs approximately 0.8 to 0.9 pound, and also can be used as a ground sheet in contaminated terrain. The Soviets claim the cape can resist liquid blister gas penetration for approximately 15 minutes.

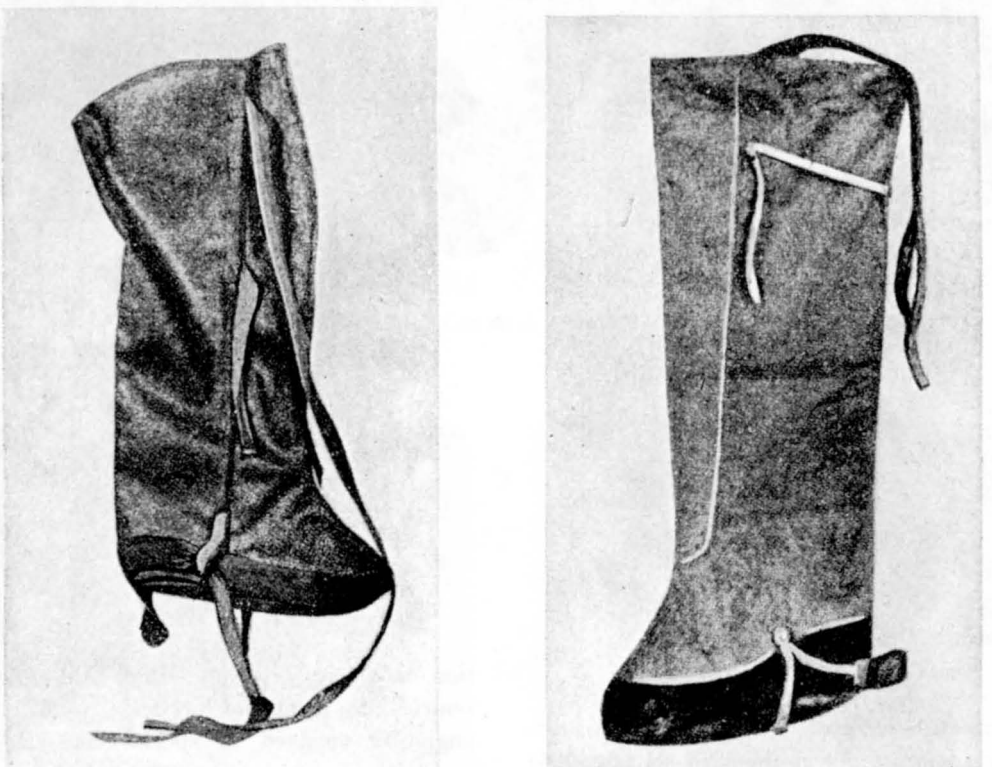


Figure 309. Protective overboots.

3. PERMEABLE PROTECTIVE CLOTHING

a. Protective clothing PF. PF is an "absorbent" protective clothing which, presumably, consists of permeable clothing treated with chemicals to neutralize particles of liquid blister gases and blister gas vapor. The set consists of a jacket and trousers. The Soviets state that clothing of this type is available for general issue and will protect

against exposure to liquid war gases for approximately one-half hour at temperatures of from 68° to 77° F.

b. Impregnated permeable protective clothing. Impregnated uniforms and underwear are issued to personnel likely to become exposed to blister gas vapor for an extended period of time. The Soviets state that, at from 77° to 83° F., the complete set of impregnated clothing provides protection for from 1½ to 2 hours against a vapor concentration of from approximately 0.05 to 0.06 ounce of blister gas per 1,000 cubic feet of air.

Figure 310. Protective cape.

4. ANIMAL PROTECTION

Two models of gas masks for horses are in use. One, a damp mask of conventional design, consists of a fabric bag which can be saturated with a neutralizing solution and fitted over the animal's upper jaw. The other is a dry mask (fig. 311), consisting of a rubber muzzlepiece connected to two filter canisters (fig. 312) by corrugated rubber hose. The Soviets state that, under field conditions, moving horses are protected for approximately 2 hours against phosgene and for approximately 1 hour against hydrocyanic acid.

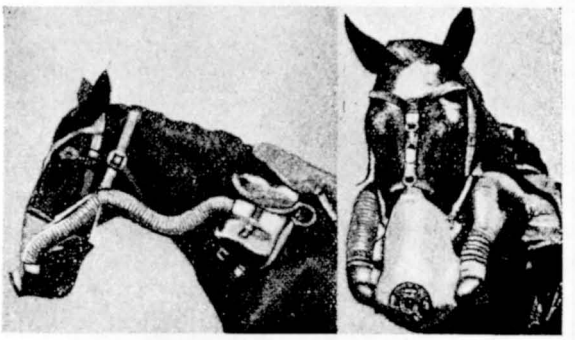


Figure 311. Dry-type horse gas mask.

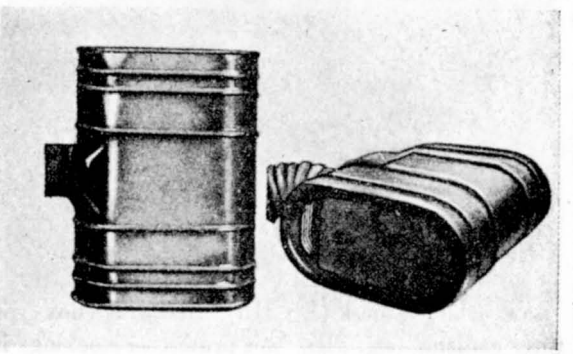


Figure 312. Horse gas mask canisters.

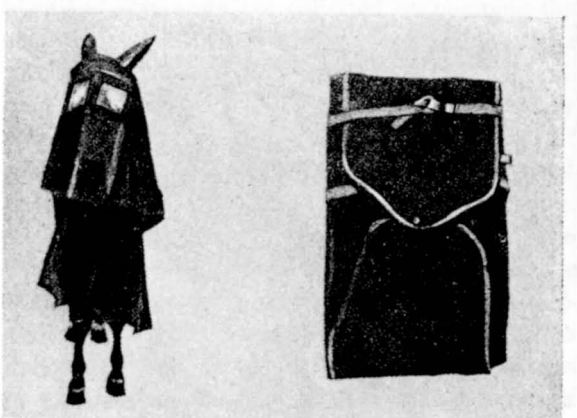


Figure 313. Horse protective cover and carrier.

An oilskin protective cover with plastic eyepieces (fig. 313) and oilskin leggings (fig. 314) are used to protect horses against liquid blister gases.

Figure 314. Horse protective legging.

A special gas mask (fig. 315) fitted with a box type filter canister (fig. 316) and protective stockings is provided for dogs.

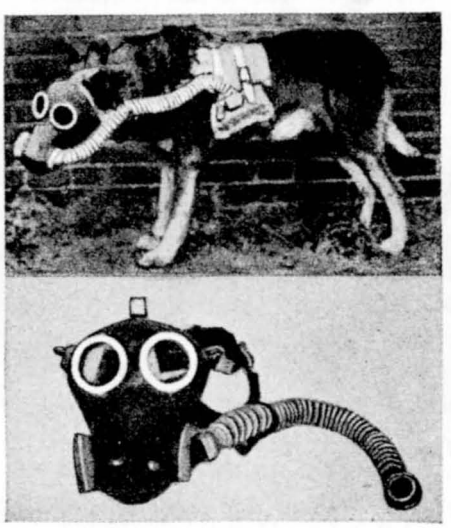


Figure 315. Dog gas mask.

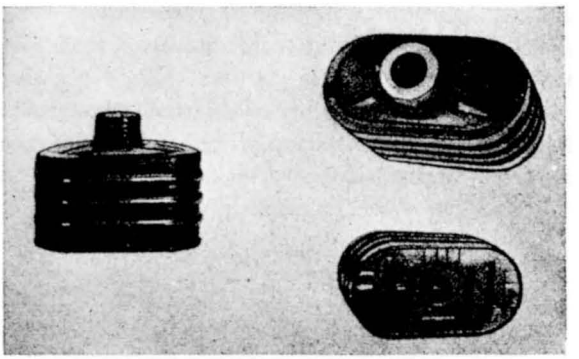


Figure 316. Canister for dog gas mask.

5. COLLECTIVE PROTECTION

Several models of filter canisters and a portable air blower, KP4–A, are used for supplying filtered air to shelters and fixed installations.

The collective protector canisters are cylindrical containers with flanged air intake openings at the sides and central air outlets at the tops. Filter canisters FPU–50 and FPU–360 contain both mechanical and chemical filters. Canister FPUMF–200 (fig. 317) contains a mechanical filter, and canister FPUMSh–100 (fig. 318), a chemical filter. The characteristics of the collective protector canisters are as follows:

	FPU–50	*FPU–360*	*FPUMF–200*	*FPUMSh–100*
Height (in.)	16.5	33.5	15.7	17
Diameter (in.)	21.6	30	21.3	19.7
Weight (lb.)	143	484–528	70.4	149.6
Capacity (cu. ft. per hr.)	1,765.5	12,511.6	4,237	6,356
Hours life (at 0.00045 oz. phosgene per cu. ft.)	20	8–10	.....	.....

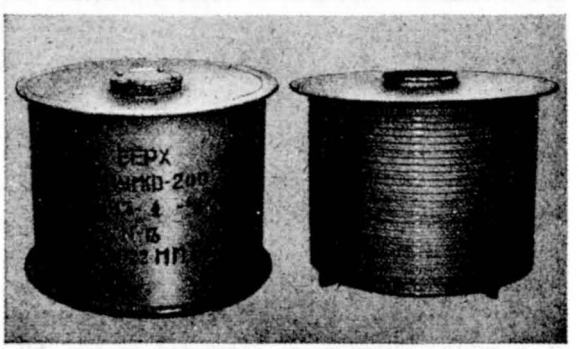


Figure 317. Collective protector canister FPUMF–200.

Filter units of larger capacity can be assembled by connecting several canisters in series.

The rotary air blower KP4–A is operated manually or by an 0.5-kilowatt electric motor. The blower delivers a maximum of 10,581 cubic feet of air per hour. Its average hourly output when operated by hand is approximately 8,818 cubic feet.

a. Gasproof shelter tent PP–2. The portable PP–2 gas shelter is intended for use by divisional staffs. The shelter consists of a 8.2- by 9.8- by 9.8-foot tent made of gasproof fabric mounted on a collapsible wooden frame. The tent is equipped with a gas lock and gasproof windows. It is provided with a collective protector. The complete shelter weighs approximately 451 pounds.

Figure 318. Collective protector canister FPUMSh–100.

6. GAS DETECTORS

a. Gas detector set PGG–1. The PGG–1 (fig. 319) is packed in a wooden or light metal carrying case measuring 11 by 8 by 4 inches. It weighs approximately 11 pounds complete. It is designed for detection of war gases in the air, for detection of contamination, and for the collection of unidentified war gases present in the air. The set includes an aspirator pump, detector papers, detector tubes, and accessories.

Phosgene, hydrocyanic acid, cyanogen halides, and arsine can be detected in the air by means of four different kinds of white detector papers, which develop characteristic colors when exposed to these war gases. The detector paper strips are exposed to the contaminated air or they are placed in a special holder, and the aspirator pump used to draw air through the strips adamsite chloraceptophenone, arsenicals, mustard gas, and nitrogen mustard are detected by drawing the air through detector tubes containing silica gels which, when treated with liquid reagents, develop a specific coloration when the test is positive. Samples of identified war gases are collected by pumping the contaminated air through special tubes containing a filling which absorbs and retains the gases. Contamination with liquid blister gases is detected by means of two types of colored papers. A roll of such paper is held in a small rectangular metal container, which can be affixed to the end of a stick, when making the test. The free end of the detector paper strip, exposed through a slit in the container, is placed against the suspected contamination. The light purple detector paper, K, turns dark purple on contact with liquid mustard gas or nitrogen mustard and green in the presence of liquid Lewisite. The pink colored detector paper, TSNITI, can then be used to differentiate mustard gas from nitrogen mustard, the paper turning blue on contact with mustard gas or Lewisite, and remaining unchanged on contact with nitrogen mustard.

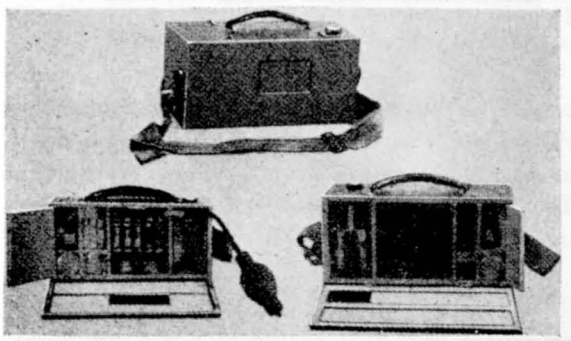


Figure 319. Gas detector set PGG–1.

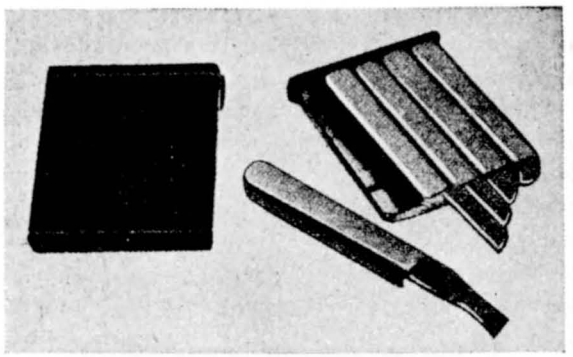


Figure 320. Gas detector set GN.

b. Gas detector set GN. The GN set (fig. 320) is contained in a light metal box measuring 2.8 by 2 by 0.4 inches. Its sliding trays hold five oblong, gastight metal containers with strips of detector paper.

Four of these containers hold the same detector papers as those provided with the detector set PGG–1 and are used to detect phosgene, hydrocyanic acid, cyanogen halides, and arsine in the air. The test is made by pulling a strip of detector paper out of the container to expose a portion of the paper to the air. The fifth container holds strips of detector paper K, which are used to detect liquid blister gases.

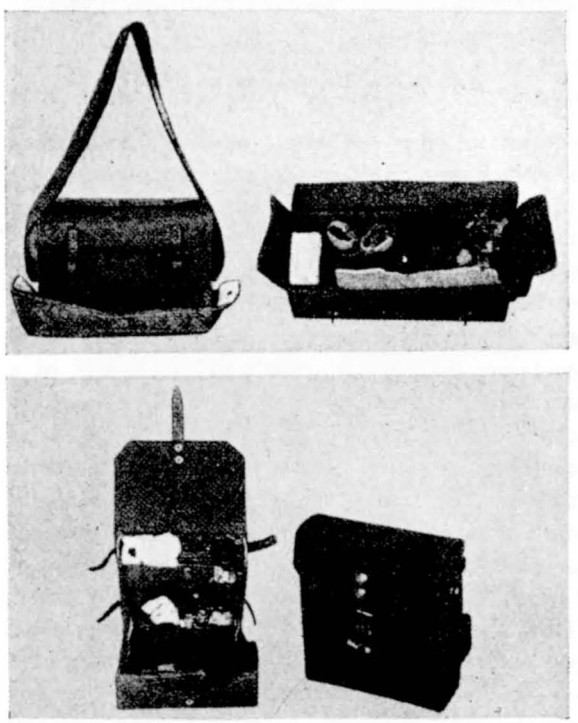


Figure 321. Gaso scout kits SKhR–1 (top) and SKhR–2 (bottom).

c. Gas scout kits. The kit includes a set of small white-red flags and phosphorescent plates for marking contaminated areas, a GN gas detector set, a roll of K detector paper in its metal container, rubber gloves, compass, notebook, pencil, knife, and an individual decontaminating packet. The SKhR–1 model (fig. 321) is packed in a canvas satchel with rubberized cloth cover and shoulder sling. The SKhR–2 model (fig. 321) is packed in a canvas satchel with loops for suspension from the belt.

7. FIELD LABORATORIES

a. Field laboratory AL–2. The AL–2 consists of a motor vehicle equipped for identifying enemy chemical warfare agents. Its primary function is to ascertain whether new agents are being employed by the enemy. The laboratory personnel consists of one chemist, one laboratory assistant, and a driver-mechanic. Field laboratory AL–2 is attached to corps or division.

b. Laboratory train. The unit is contained in three specially equipped passenger cars and one freight car. It consists of an analytic section, a toxicological section, and a protective equipment section. The mission of the laboratory is to study enemy chemical warfare material, identify new war gases, and test the serviceability of friendly chemical warfare equipment. Eighteen men staff the laboratory. The laboratory train unit is assigned to theater headquarters.

8. DECONTAMINATING AGENTS

a. Chlorinated lime. Chlorinated lime is available in grades A and B, which contain at least 36 and 32 percent of active chlorine respectively. Lime is used for decontamination of areas containing mustard or Lewisite gases. It is packed in wooden, tar-paper lined barrels L–35, L–50, and L–250.

b. Calcium hypochlorite. Calcium hypochlorite contains approximately 60 percent active chlorine. It is used in the same manner as chlorinated lime. It is packed in metal drum L–100, containing 165 pounds of calcium hypochlorite and weighing 220 pounds when filled.

c. Sulfuryl chloride. Sulfuryl chloride contains approximately 52 percent active chlorine. It is used for decontamination of areas containing mustard or arsenicals, especially during cold weather. In warm weather, it is mixed with crude petroleum. A 50-percent solution of sulfuryl chloride in dichlorethane is used for ground decontamination. A 10- to 20-percent solution is used for decontaminating wooden and metal parts of heavy equipment. Sulfuryl chloride is packed in metal drums L–250 and OST–2077.

d. Dichloramine B. Dichloramine B contains from 56 to 58 percent active chlorine. Solutions of dichloramine B in chlorinated solvents are used for decontamination of areas containing mustard gas and lewisite.

A 2- to 3-percent solution in carbon tetrachloride is used as a skin decontaminant, and a 10-percent solution in dichlorethane for decontaminating weapons and equipment. From 44 to 55 pounds of dichloramine B is packed in a wooden barrel lined with parchment paper.

e. Chloramine B. Chloramine B contains approximately 27 percent active chlorine. An aqueous-alcoholic solution of chloramine B is used for decontamination of skin and clothing.

f. Sodium sulfide. Technical grade sodium sulfide is packed in metal drums. It is used, as a 5- to 10-percent solution in water or alcohol, for decontaminating areas containing mustard gas, and as a 30-percent solution in water to decontaminate areas containing lewisite.

g. Decontaminating agent TN. TN is tetrachlorethylenediamine, containing approximately 70 percent active chlorine. A 50-percent solution of this chemical in carbon tetrachloride (TN–50) is packed in metal drum L–100. It is used diluted to a 10- to 15-percent solution (TN–10) in chlorinated solvents for decontaminating vehicles and heavy equipment contaminated with mustard gas or Lewisite.

9. INDIVIDUAL DECONTAMINANTS

a. Individual decontaminating packet TD–2. The TD–2 (fig. 322) consists of a cardboard box containing six plastic capsules, wrapped in cotton gauze and filled with a decontaminant solution, and three similar capsules containing an inhalant to counteract the effects of harrassing smokes. The packet includes two cotton gauze pads for bathing the eyes.

Figure 322. Individual decontaminating packet TD–2.

Several other models of similar decontaminating packets are believed to be available to the individual soldier for neutralizing blister gas particles on the kin or on the clothing (fig. 323).

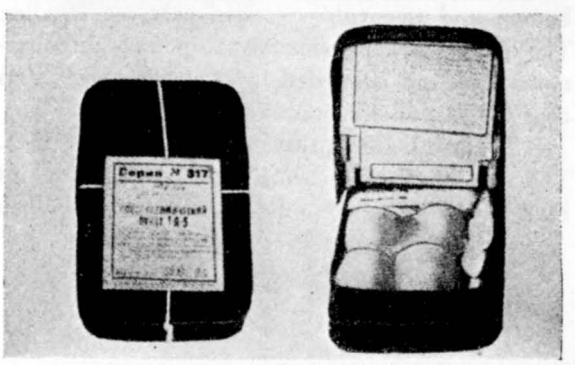


Figure 323. Individual decontaminating packet.

b. Horse decontaminating packet. The packet is a cardboard box, one edge of which has a serrated rim. It contains a decontaminant powder with an active ingredient, either bleach or a compound of the chloramine type. After the decontaminant is spread over the contaminated area, the serrated rim of the box is used to comb the powder into the animal's coat.

10. DECONTAMINATING EQUIPMENT

a. Portable decontaminating apparatus RDP–1. The RDP–1 (fig. 324) is a spraying device including a metal tank carried on the operator's back and connected to a lever-actuated hand pump. The complete apparatus weighs approximately 15.7 pounds empty. The tank has a capacity of 3.2 gallons, and the apparatus can project a stream of liquid 8 feet.

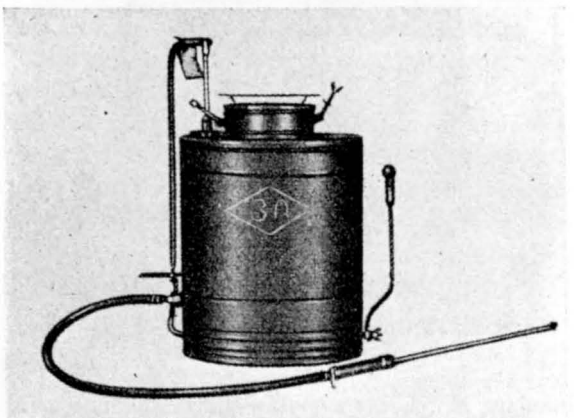


Figure 324. Portable decontaminating apparatus RDP–1.

b. Decontaminant scattering sieve. The sieve is a rectangular wooden box with a perforated bottom and removable wooden carrying handles. The box holds approximately 40 pounds of chlorinated lime and is carried by two operators. It is used for ground decontamination.

c. Ground decontaminating cart VDP–1. The cart (fig. 325), which holds 121 pounds of bleach, is used for ground decontamination. When the cart is propelled by the operator, the decontaminant is distributed automatically. The cart will cover an area 3 feet wide and 164 yards long.

d. Ground decontaminating vehicle ACh I–5. The ACh I–5 is a motor vehicle equipped with a spray apparatus. It carries 4,180 pounds of bleach. The vehicle can decontaminate a strip of ground from 15 to 16.5 feet wide and from 547 to 657 yards long when driven at a speed of 6 miles per hour.

e. Decontaminating vehicle KDP–250 (horse-drawn). The KDP–250 (horse-drawn) is used to decontaminate infantry weapons and small arms. The equipment includes one portable decontaminating apparatus RDP–1 and a pump with six spray hoses. It carries 220 pounds of bleach. The vehicle can decontaminate 50 percent of the equipment of a rifle battalion or equivalent unit. The Soviets state that one KDP–250 vehicle is attached to every infantry battalion and to each horse-drawn artillery division.

f. Decontaminating vehicle ADM–750. This truck is adapted for decontaminating air corps equipment, vehicles, and artillery weapons. The decontaminating equipment includes two portable decontaminating apparatus RDP–1 and two pumps with eight spray hoses. It carries 880 pounds of bleach. The vehicle can decontaminate eight items simultaneously, and treat 50 percent of the equipment of a separate tank battalion or equivalent unit.

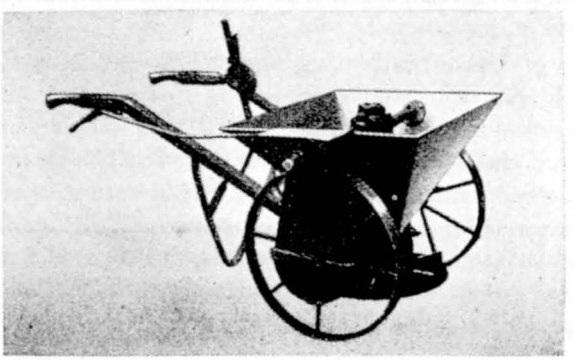


Figure 325. Ground decontaminating cart VDP–1.

The Soviets state that one ADM–750 vehicle is attached to every tank battalion and to each motorized artillery division.

g. Clothing decontaminating vehicle AGV–2. The AGV–2 is a steam generating unit mounted on a truck and two portable decontamination chambers, each having a capacity of 2,236 cubic feet. The unit can generate from 4,708 to 5,885 cubic feet of warm air per minute or 308 pounds of steam per hour.

The decontaminating chambers can accommodate 150 sets of protective clothing. The crew includes two operators and six assistants.

h. Clothing decontaminating vehicle BU–2. The BU–2 is a 2½-ton truck equipped for decontamination of clothing by boiling. The unit includes two 92.5-gallon steeping vats, a 185-gallon water tank, a wringer, and a field drier. The vehicle is capable of decontaminating 100 sets of underwear simultaneously. The crew includes two operators and four assistants.

i. Motorized water decontaminating unit BAU. The BAU purifies contaminated water by pumping it through special filters. The pumping equipment can be operated by hand or mechanically, purifying 211 or 1,057 gallons per hour respectively.

j. Personnel decontaminating units. At least five types of personnel decontaminating units are available. All consist essentially of a portable shower bath with water heating and pumping equipment.

The V–2 unit (fig. 326) has a hand-operated pump, an eight-nozzle shower bath, and is carried on a horse-drawn vehicle. V–3 is similar to V–2, but has only six showers and is carried on a two-wheeled horse-drawn cart.

K–3 and K–4 units have 16 shower nozzles, 64-gallon hot water tanks, and engine-driven pumps. Each unit is carried on a 1½-ton truck.

GCh–1 is a four-nozzle shower bath unit and accessories. It is carried in three bales by a pack horse.

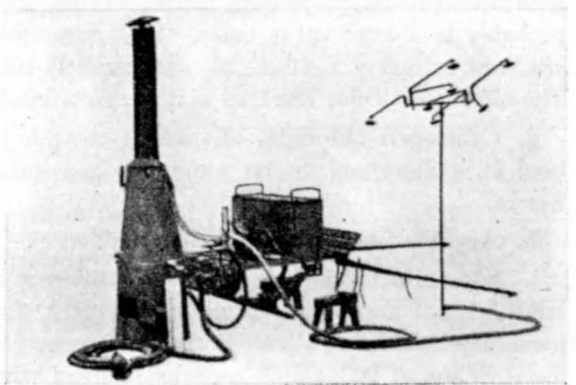


Figure 326. Personnel decontaminating unit V–2.

Figure 327. "Sniff sets."

Figure 328. Kits containing samples of war gases.

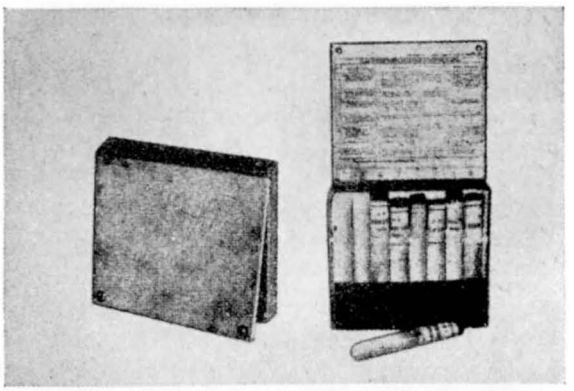


Figure 329. Kit of samples of decontaminants.

The Soviets state that the units are capable of decontaminating the following number of men in 30 minutes:

V–2	56–64 men.
V–3	42–48 men.
K–3 or K–4	112–128 men.
GCh–1	28–32 men.

11. TRAINING AIDS

Various models of "sniff sets" (fig. 327) and kits containing samples of actual and simulated war gases (fig. 328) and decontaminants (fig. 329) are used in training to familiarize personnel with the physical properties and characteristic odors of chemical warfare agents. A small tent, made of impermeable fabric, is used as a portable gas chamber for training in the adjustment of the gas mask (fig. 330).

Figure 330. Portable gas tent.

Section III. OFFENSIVE EQUIPMENT

1. WAR GASES

a. Phosgene. Phosgene is used in artillery and mortar projectiles and in aerial bombs. It is mixed with chlorine in portable cylinders. Bulk containers are steel cylinders E–10, 2.6-gallon capacity, and E–24, 6.3-gallon capacity. They are marked with a blue band.

b. Chlorine. Bulk containers for chlorine are steel cylinders E–10 and E–24, marked with a green band.

c. Mustard gas. Mustard is used in artillery and mortar projectiles, aerial bombs, aircraft spray tanks, ground spraying equipment, and in frangible light metal or glass spheres dropped from aircraft. Bulk containers are metal drums L–100 and tank cars. The identifying color marking is one red band.

d. Lewisite. Lewisite is used in artillery and mortar projectiles, aerial bombs, aircraft spray tanks, and in mixtures with mustard gas. Bulk containers are metal drums L–100 and tank cars. The identifying color marking is two red bands.

e. Nitrogen mustard. Nitrogen mustard probably is available.

f. Hydrocyanic acid. Hydrocyanic acid is used in artillery projectiles, aerial bombs, and probably in aircraft spray tanks. Bulk containers are steel cylinders E–10, E–24, and drum L–100. The identifying color marking is one yellow band.

g. Cyanogen chloride. Cyanogen chloride is used in artillery and mortar projectiles and aerial bombs.

h. Arsine. Arsine possibly is available.

i. Adamsite. Adamsite is used in artillery and HE/Chemical mortar projectiles, aerial bombs, and harassing smoke candles. Bulk containers are metal drums of 26.5-gallon capacity, marked with one green and one white band.

j. Diphenylchlorasine. Diphenylchlorasine is used in harassing smoke candles. Bulk containers are metal drums of 26.5-gallon capacity, marked with one blue and one white band.

k. Chloracetophenone. Chloracetophenone is used in artillery projectiles, HE/Chemical bombs, and harassing smoke candles. Bulk containers are metal drums, marked with one green and two white bands.

2. CHEMICAL ARTILLERY SHELLS
For details, see chapter VIII.

3. CHEMICAL MORTAR SHELLS
For details, see chapter VIII.

4. CHEMICAL GRENADES
For details, see chapter VIII.

5. CHEMICAL AIRCRAFT BOMBS
Chemical aircraft bombs include:

Smoke bombs.
Incendiary bombs.
Gas bombs.
Frangible spheres.
Cluster adapters.
For details, see chapter XI.

6. AIRCRAFT SPRAY TANKS
For details, see chapter XI.

7. HARASSING GAS CANDLES
Chemical fillers and types of fillers are as follows:

YaM–11	Chloracetophenone.
YaM–22	Adamsite.
YaM–31	Sneeze gas.

In harassing gas candles of recent design, the fuel mixture and the chemical filler are contained in separate compartments. Old type candles are filled with a combustible mixture containing the chemical agent.

Characteristics of harassing gas candles are as follows:

Model	YAD–11		YAD–21		
Type	New	Old	Old	Old	New
Height (inches)	2.7	2.8	4.1	4.3	6.7.
D ameter (inches)	3.3	3.1	6.1	4.8	2.4.
Weight (pounds)	0.79	0.81	4.8	4.6	1.98.
Chemical filler (pounds).	0.1	0.45	3.74	3.4	0.1.
Chemical filler (type)	CN	24% CN	30% M	22% CN	CN.
Markings	Khaki can, blue line on lid and casing.	Khaki can, blue band on lid and casing.	Khaki can, yellow band on lid and casing.	Khaki can, blue lid.	Tin can, red band.

A harassing gas candle, weighing 4.4 pounds, is said to generate a maximum volume of harassing gas for approximately 5 to 6 minutes.

8. SCREENING SMOKE CANDLES
Six types of screening smoke candles have been reported, the model designation of which are not known. Their characteristics are as follows:

Type filler	Height (inches)	Diameter (inches)	Weight (pounds)	Filler (pounds)	Markings
HC	6.5	1.6	0.9	0.7	None.
HC	6.3	3.6	4	3.2	None.
HC	6.3	1.6	.9	.7	None.
Tar	9.3	4.1	5.3	4.6	Grey green can.
Anthracene	4.2	3.5	2.2	1.7	Khaki can, ½ lid white.
Napthalene	4.2	3.5	2.2	1.9	Khaki can, ½ lid black.

a. Screening smoke candle DM–11 (fig. 331).

Candle contains 4 pounds of a smoke mixture consisting of potassium chlorate, ammonium chloride, and crude anthracene. It is reported that the full volume of smoke emission is reached 1 minute after ignition and continues for from 6 to 8 minutes, producing an effective smoke screen from 164 to 219 yards in length. The candles are packed 20 to a wooden box, which also contains 26 igniter cartridges and 5 scratcher blocks.

CHARACTERISTICS

Height	4.2 inches.
Diameter	6.1 inches.
Total weight	4.8 pounds.

b. Smoke pot DSh–100.

CHARACTERISTICS

Height	47.2 inches.
Diameter	15.7 inches.
Total weight	286 pounds.
Filler	220 pounds, anthracene type smoke mixture.

c. Smoke pot DB–11.

CHARACTERISTICS

Height	16.5 inches.
Diameter	13.4 inches.
Total weight	96.8 pounds.
Filler	81.4 pounds anthracene type smoke mixture.

Figure 331. Screening smoke candles DM–11.

9. CONTAMINATING EQUIPMENT AND CHEMICAL VEHICLES

a. Portable contaminating apparatus NPZ–3. The NPZ–3 is a portable spray apparatus used for dissemination of blister gases.

CHARACTERISTICS

Capacity	4.2 gallons (44 pounds mustard gas).
Weight (empty)	17.6 pounds.
Coverage	2152 to 8608 square feet.

b. Chemical vehicle ARS–SK. The ARS–SK is a chemical supply and service motor vehicle for bulk transportation of chemical agents and servicing of chemical warfare equipment. The Soviets state that, under favorable conditions, the vehicle also can be employed for ground contamination, smoke emission, or for ground decontamination.

CHARACTERISTICS

Capacity	423 gallons mustard gas or 291 gallons smoke agent or decontaminant.
Width of contamination	23 to 55 feet.
Density of contamination	0.08 to 0.33 ounce per square foot.
Duration of smoke emission	30 to 60 minutes.
Width of decontamination	9.8 to 13.1 feet.
Density of decontamination	0.07 to 0.09 gallon per square yard.
Maximum road speed	18 to 25 miles per hour.
Cross country speed	5 to 6 miles per hour.
Crew	2.

c. Chemical tank KhT–130. The KhT–130 is the chassis of the now obsolete T–26 tank adapted for ground contamination, dissemination of smoke, or for flame projection.

CHARACTERISTICS

Capacity	95 gallons.
Width of contamination	33 to 82 feet.
Density of contamination	0.08 to 0.33 ounce per square foot.
Duration of smoke emission	11 to 25 minutes.
Flame projection range:	
Stationary	55 to 65 yards.
In motion	45 to 50 yards.

PART VI. MEDICAL EQUIPMENT

Section I. GENERAL

1. EFFECTIVENESS

The Red Army is markedly deficient in the quantity and it is partly inadequate in the quality of its medical equipment. However, many shortages are overcome by improvisation. This is noted particularly in evacuation equipment.

It is considered, however, that the medical service functioned successfully during World War II despite the enormous task which confronted it and the limited amount of equipment available, and in spite of the fact that the number of medical personnel, particularly that of nurses, was reported by the Soviets as inadequate.

Section II. TYPES OF EQUIPMENT

1. EVACUATION

For channels of evacuation, see pages VII–29 and VII–30.

Transport is provided, according to the echelon by divisional or corps ambulance convoy, which is reported to be equipped, normally with 25 two-horse and 35 one-horse ambulance carts. These carts are equipped with springs, and carry two lying or four sitting cases. In winter some ambulances, even those drawn by horses, are heated. Dog sleds and self-propelled sleighs also are used in winter. Ski-borne stretchers are reported to be employed widely. Wherever possible, motor ambulances are provided. Hospital trains, river hospital ships (along the Volga and other large rivers), and ambulance planes are used. A one-engine training plane, PO–2, is used to transport the seriously wounded for short distances. Toward the end of World War II, entire air regiments were reported to be put at the disposal of the medical corps.[1]

Narrow gage railroads also are used for evacuation purposes. The locomotives are small and are gasoline-driven. Special small cars carry four litters, two on each side. Such a narrow line usually has branches extending throughout the various parts of a hospital area.

2. HOSPITAL ACCOMMODATION

Buildings are used as hospitals wherever and whenever possible. Otherwise, various types of tents are used. A hospital tent in general use can house 16 cots, or can serve as an operating room with two tables and a dressing room with two tables.

3. SANITATION

The open-pit type of latrine is used in most of the hospitals in combat areas. They consist of wooden frame buildings made of slabs. These are partitioned into two parts, one for men and one for women. Latrines are not fly-proofed, nor is there evidence of chloride of lime or cresol compounds. It appears that incineration is not practiced.

4. WATER SUPPLY

No water carts are included with the mobile hospital's equipment. Water, if available from lakes or rivers, is stored in any available improvised containers, and then chlorinated. When there is no water on the spot, the water supply for the hospital is derived from a well dug by the unit personnel (mostly women). The well has no outer protective sheath of piping to prevent contamination or seepage along the pipe through which water is pumped.

5. BATHING FACILITIES

Bathing facilities vary. Whenever possible, Russian types of bath (*banya*) are used. In a mobile hospital, two types of small unit baths are used. The first is a hut with an earth floor, on which stones are heated by a wood fire. When the stones are very hot, water is poured on to fill the hut with steam. The second is a hut with a sloping floor to drain used water. Hot water is carried in a bowl from a large copper kettle outside. Some hospitals contain showers. Tubs are used infrequently because they are unpopular with the majority of the Soviet population.

Special 19-car bath trains also are used. They are under supervision of the medical corps. Soldiers enter at one end of the train, shedding their clothes. In the next car, they receive towels, soap, and the cluster of leaves (*vyennik*) [2] with which to beat themselves while in the steam bath to increase the circulation of the blood. Another car contains the steam bath (*banya*). Another contains showers. The clothing, which has been laundered and disenfected is claimed at the other end of the train. A lounge car, equipped with reading matter, radio or victrola, and playing cards or chess, is provided.

6. DELOUSER

The delouser is a dugout or semidugout type, with a wood fire burning under the floor. A temperature of 170° is maintained, and clothing is hung on pegs inside the dugout.

[1] The extent to which air transport has developed medical evacuation may be judged from a Soviet statement that there were as many as 105 "sanitary aviation" stations established in 1945 to care only for civilian needs. The number of flying hours was reported at 80,000 and the distance flown as 4,968,000 miles. Because Red Army needs get priority over civilian requirements one may safely assume that both the number and the quality of ambulance plane for military service are being increased.

[2] A *vyennik* is as indispensable in a Russian bath as soap and towels are in the United States.

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7. HEATING EQUIPMENT

Small hospitals use portable stoves, while large hospitals are provided with central heating.

8. LIGHTING EQUIPMENT

Some hospitals are provided with a central generating plant. It uses two generators. Power is provided by a steam boiler or tractor.

9. REFRIGERATION

Refrigeration is provided by a deep pit, with a series of three dead air spaces separated by successive wooden frames.

10. COMMUNICATIONS EQUIPMENT

Many hospitals are provided with a radio center. Constant radio and telephone communication is maintained with all parts of the sector. A public address system is used to provide entertainment and for announcements.

11. BLOOD BANK

Blood is kept in standard sealed glass ampoules of 250 centimeters capacity. The temperature of the storage room is maintained below 8° C. Ice is made available in summer.

12. PHARMACY

Most pharmaceutical containers are improvised. The dispenser makes his own distilled water and sterilized packets of dressings in an auto-clave.

13. LABORATORY

The type of laboratory usually found in western civilian or military hospitals is entirely lacking in the U. S. S. R. Only the simplest laboratory procedures can be performed in a field hospital.

14. X-RAY

One type of field X-ray equipment used quite extensively is mounted on a 1½-ton truck. The unit consists of the truck, trailer, an electric generator powered by the truck engine, and the X-ray equipment. The capacity of this equipment in 1939 was 80 patients per day. It normally is located near a surgical unit. An X-ray tent has a floor space of 11.5 by 11.5 feet. Metal tubes form the framework of the tent.

15. SURGICAL EQUIPMENT

The Red Army is reported to possess three new alloys (osteosynthetics 1, 2, and 3), which are alleged to be absorbable and which are used for fixation of fractures. Instruments are kept in loops sewn on squares of canvas with wire stretchers to form a frame. These are packed in layers. Dietrich splints of flat, thin wood are used. Occasionally, splints prepared from wire or aluminum are used. Other medical equipment usually is of the simplest type.

16. WARDS

A ward usually contains very closely packed double bunks. They are kept very clean and neat, and all beds are provided with pillows, sheets, and sufficient blankets. The bunks usually are of improvised rough timber construction. Occasionally small unpainted iron cots are available. Matresses are thin and hard.

PART VII. INDIVIDUAL AND ORGANIZATIONAL EQUIPMENT

Section I. INDIVIDUAL EQUIPMENT

1. GENERAL

Red Army individual equipment was redesigned in 1938, but still was in the early stages of procurement when the Germans attacked in 1941. The existing equipment, consequently, was not sufficient to meet the immediate requirements, and the program was modified. It is impossible, therefore, to form a just comparison between the equipment used by the Red Army during World War II and that used by other armies, although the equipment resulting from the redesign was of sound construction and design and compared favorably. It is believed that the Red Army will resume production of the prewar type equipment, and also will incorporate improvements observed during World War II.

2. FIELD EQUIPMENT

a. Officers. The equipment carried by a Red Army officer varies according to his assignment and the military situation. Regulations prescribe a Sam Browne belt, pistol or revolver, field glasses,

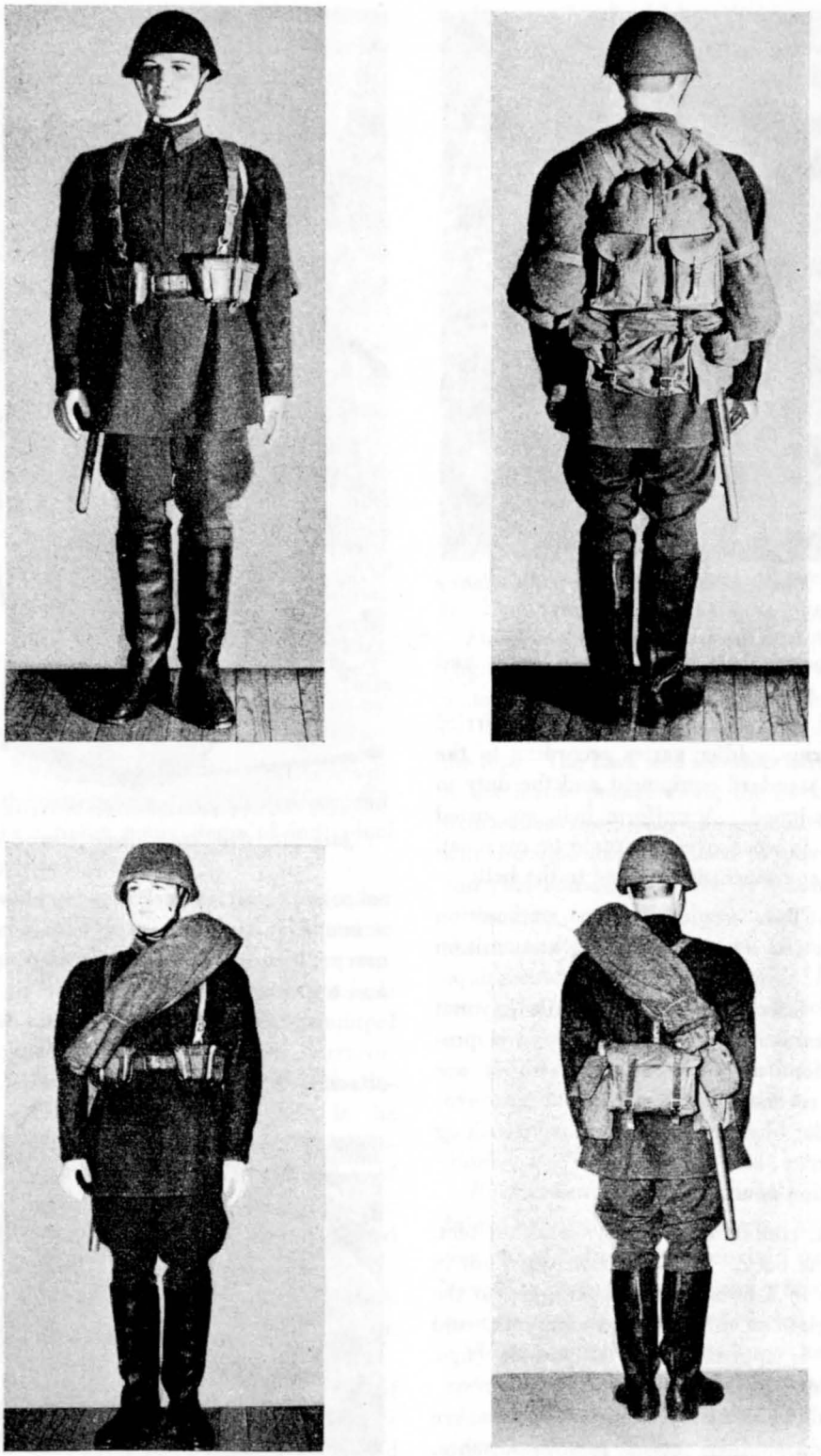

Figure 332. Standardized field (top) and combat (bottom) equipment.

Figure 333. Red Army machine gun platoon in field during summer. Note lack of uniformity.

gas mask, musette bag, leather map case, and poncho-shelter tent.

b. Enlisted men. The field equipment carried by the Red Army soldier varies according to the availability of standard equipment and the duty to which he is assigned. A uniform belt, supported by suspenders, is worn over the tunic or overcoat. The following equipment is attached to the belt:

In front: Two sets of leather ammunition pouches and one fabric reserve ammunition pouch.

Left side: Grenade pouch and knife bayonet with scabbard. (No scabbards are provided for angular bayonets, which are carried reversed on the rifle).

Right side: Entrenching tool, entrenching tool carrier, and canteen.

Back: Ration pouch, containing mess kit.

A field pack, containing the poncho-shelter tent, is carried on the back. The overcoat, when not in use, is carried in a horseshoe roll strapped to the pack. The weight of this standard equipment and issue clothing is approximately 60 pounds (figs. 332, 333, 334, and 335).

c. Mounted troops. Mounted troops are equipped with a slightly curved, guardless, sabre, weighing 3.5 pounds; a bayonet attached to the sabre scabbard; a carbine or submachine gun and ammunition pouches (except for officers, who may carry a pistol or revolver); a map case; a canteen; and a gas mask. The remainder of their personal equipment, including cloak-shelter tent, blanket or overcoat, and personal clothing, either is rolled and attached to the saddle or is packed in one of the

Figure 334. Red Army troops moving during winter.

Figure 335. Red Army troops on the march.

saddle bags. The other saddle bag contains horse equipment, including gas mask, calks, brushes, curry combs, hoof cleaner, camouflage material, etc.

3. COMBAT EQUIPMENT

a. Officers. Combat equipment for officers is the same as field equipment.

b. Enlisted men. It was originally intended that no pack would be worn and that the uniform belt, supported by a suspender, would be used to carry the grenade and rations pouches, canteen, and entrenching tool. The overcoat was to be carried in a horseshoe roll slung over one shoulder and across the body. The gas mask was to be slung over the other shoulder. Because of the breakdown of the equipment procurement program, however, the grenade and rations pouches and suspender were not issued in quantity. Instead, grenades were hung on the belt or carried in pockets, and a drawstring rucksack was issued for carrying rations, mess kit, poncho-shelter tent, and rifle accessories.

c. Mounted troops. Combat equipment for mounted troops generally is the same as infantry field equipment.

4. ITEMS OF EQUIPMENT

a. Belt and suspenders. A belt and suspenders are used to support many items of individual equipment (fig. 332).

Uniform belt. A heavy russet brown leather belt, approximately 1½ inches wide is issued to each soldier. This belt is used in the field to support the soldier's ammunition pouches, grenade pouch, canteen, rations pouch, and entrenching tool (fig. 332).

Suspenders. Because of the weight of items intended to be carried on the uniform belt in the field, russet brown leather suspenders were provided for the belt's support. The modification of the Red Army's procurement program limited the supply of this item, and it was, therefore, issued only to special troops (fig. 332).

b. Ammunition bandoleers and pouches. Ammunition is carried in four pouches and a cloth bandoleer.

Leather ammunition pouch. The standard set of leather russet brown ammunition pouches (fig. 332) are fitted with belt loops and have two flapped pockets, each of which will carry 20 rounds of rifle ammunition. Each set of pouches has a ring into which the suspender may be hooked for support of the uniform belt.

Reserve ammunition pouch. The reserve ammunition pouch is made of durable fabric, and is believed to carry six five-round rifle clips.

Ammunition bandoleer. An ammunition bandoleer is slung diagonally across the shoulder. It consists of a heavy fabric strip, the top of which is folded over to form a flap, which is held in place by an adjustable web belt and a tie strap. The bandoleer has a capacity of 14 five-round rifle clips.

Spare magazine carrier. A durable canvas carrier, with narrow pockets, accommodates three submachine gun box magazines. Belt loops are used to attach it to the uniform belt. Another form accommodates submachine gun drum magazines.

c. Packs. Several types of packs are used by the Red Army.

Field pack. The standard Red Army field pack (fig. 332) is made of heavy duck and is approximately 12 inches square and 4 inches deep. It has a drawstring throat and a buckled flap over the top. The back and shoulder straps are padded. A flat inside pocket along the back carries underwear, footwraps, etc. Two small outside pockets with buckled flaps are used to carry toilet articles and rifle accessories. The remaining inside space is used to carry clothing, extra rations, poncho-shelter tent, and other small items of individual equipment. A small drawstring fabric sack for tent poles, pegs, and ropes is attached to the bottom by leather straps. Web straps on the sides and on the shoulder straps hold the horseshoe-rolled overcoat in place. The pack was not an item of general issue because it could not be procured quickly and in quantity.

Rucksack. The rucksack is a 17- by 20-inch fabric bag with a drawstring top and padded shoulder straps. It is an improvised pack which is believed to have been devised when the field pack procurement program broke down.

Packboards. The Red Army has a number of special packboards for the carrying of heavy or clumsy loads in difficult terrain in combat. There are no general types, each packboard being de-

signed to accommodate a specific type of equipment.

d. Pouches and bags. Pouches and bags are used to carry several different types of issue items and equipment.

Ration pouch. The ration pouch is a lined fabric pouch, 7 inches deep, 9½ inches wide, and 4 inches thick. Although it was standardized as a mess kit, rations, and spoon-fork carrier, it never has become an item of general issue.

Grenade pouch. A 5- by 9-inch heavy fabric flapped pouch was designed to carry two stick-type grenades. Because of procurement difficulties, it is not an item of general issue.

Gas mask carrier. The gas mask is carried in a durable fabric pouch approximately 10 inches square. Some are issued with a flapped pocket on each side for individual decontamination and first aid equipment. A wide web strap, slung diagonally across the shoulder, supports the carrier.

Musette bag. Officers in the field carry a musette bag of durable fabric or leather, which either is carried diagonally across the shoulder or is attached to the Sam Browne belt. The bag is used to carry a leather map case, poncho or shelter tent, mess kit, and other minor articles.

Dispatch case. When necessary, officers carry a small, flat, leather dispatch case either by a diagonal strap across the shoulder or attached to the Sam Browne belt.

e. Mess kit. The Soviets have two types of mess kits. One is of aluminum, similar to that of German and Japanese issue. It is a deep pot, having a tight-fitting cover, with a clamp handle, which may be used as a plate. The other is a small, round pail, approximately 6 inches in diameter and 4 inches deep. The mess kit is carried either inside or attached to the outside of the pack.

f. Canteen. The Soviets have a number of different canteens ranging in capacity approximately from ¾ to 1 quart. Many of more recent issue are made of aluminum. They are carried in a cotton evaporation pouch.

g. Entrenching shovel. Most Red Army enlisted men are equipped with an entrenching shovel similar to the old United States shovel (fig. 332). Some of the shovels have a square instead of a rounded blade. A fabric carrier is provided.

h. Poncho-shelter tent. Each Red Army soldier is provided wih a large water resistant dark-green, fabric cloak. It is used both as a raincoat and as a shelter tent. For use as a raincoat, it has a drawstring hood, and snaps down the front. When used as a shelter tent, it may be set up singly or combined with others to make a two- or four-man tent. It is carried inside the pack. It also may be daubed with paint to serve as individual camouflage.

i. Camouflage equipment. Several types of camouflage clothing and equipment are tissued in the Red Army.

Winter clothing. A loose-fitting white overgarment of a light material, with attached hood and mittens is issued in the winter. These garments may consist of trousers and tunic or of a long tunic only.

Summer clothing. Mottled khaki overgarments of durable material with attached bast tufts are issued in the summer. These items usually are of a coverall design and are fitted with a hood and a tape on each trouser cuff.

Camouflage nets. Small nets, 4.5 by 2.5 feet, are issued to some troops for camouflage use. The garnishing may be changed by the soldier when necessary.

j. Mountain equipment. Special mountain equipment for Red Army troops is similar to that issued by other armies. It consists of a 0.47- to 0.55-inch cotton hemp, or sisal alpine rope in 90-foot lengths with a tensile strength of from 2,200 to 3,300 pounds; ice axes with the usual pick-mattock head, handle with metal point, and sliding collar; alpen-stocks; 10-point crampons, which are used for traction on ice or difficult surfaces; ice and rock pitons for securing fastenings in sheer ice and rock walls; snaplinks for making attachments to pitons; double-bag sleeping bags; and lightweight single- and double-pitch floored canvas tents. Shovels, avalanche probes, and red avalanche cords are provided for rescue work.

Section II. ORGANIZATIONAL EQUIPMENT

1. GENERAL

During World War II the Red Army was handicapped by lack of quality, quantity, and variety in organizational equipment. This handicap, however, was somewhat offset by improvisations. The ability of the Soviets to produce well-made and well-designed organizational equipment when necessary is illustrated by the high standard of Red Army cavalry equipment.

There is little doubt but that efforts will be made to improve organizational equipment, and that improvements will reflect lessons learned from World War II.

2. CAMOUFLAGE EQUIPMENT

Because the Russians are outdoor people, they have a good understanding of camouflage, and maintain strict camouflage discipline.

The Red Army employs the usual methods for breaking up outlines of large objects and installations by the use of large and small woven nets, local materials, dummy distortions, wire frames, etc. Painted steel shields of uneven outline, fan-shaped wire frames to support local material, and small camouflage nets designed for use with heavy machine guns are used for individual camouflage.

3. TENTAGE

Red Army doctrine dictates the use of confiscated buildings or the construction of ground huts, rather than the general use of tents. Ground huts are made of local timbers, brushwood, tarpaulins, mud, snow, or any other material available. Occasionally, they are built on raised platforms. In semi-permanent installations, however, large 6- to 10-man tents are used. Camouflaged covered vehicles also are used for cover in bad weather and in winter. The large tents and tarpaulins also are used as improvised aid stations and command posts.

4. HEATING EQUIPMENT

The Red Army requires that troops in the field in cold climates be provided with heat when not on duty. Small wood stoves and charcoal braziers are carried by all units to provide heat in ground huts and tents. Stoves and fireplaces are improvised whenever possible.

5. RIVER CROSSING EQUIPMENT

Red Army units carry various types of river crossing equipment for scouts, combat engineers, and ammunition transport. A set of rubber waders is used for shallow stream crossings. They also may be used for deep or broad stream crossings when combined either with circular or with U-shaped one-man rubber floats and small paddles (fig. 336). One-man rubber floats often are converted into small rafts and used for ammunition transport. Respirators, with attached oxygen cylinders, are used for underwater reconnaissance, demolition, and rescue work.

6. COOKING AND BAKING EQUIPMENT

Rolling and pack stoves, field kitchens, and field bakeries are provided. The rolling stove (fig. 339) is a single-kettle, wood- or charcoal-burning cooking unit with hinged chimney. It is mounted on a two-wheel chassis and is drawn either by horse or by truck. The pack stove is a wood- or charcoal-burning single-kettle cooking unit, designed for horse or mule transport in difficult terrain. Field kitchens are wood- or charcoal-burning cooking units, usually mounted on two-wheel trailers, and generally used under static conditions. The field bakery is a three-unit, rear echelon establishment with a daily capacity of 8,800 loaves of bread. Containers are provided for the transportation of hot food to front lines. Refrigeration equipment is made available whenever possible.

7. WINTER AND SWAMP TRANSPORT EQUIPMENT

Red Army tactical doctrine requires that the greatest possible mobility and flexibility be maintained under all conditions. Consequently, much attention has been centered upon movements under adverse winter and spring conditions. Thus, for the transport of personnel, equipment, heavy guns, ammunition, and casualties, extensive use is made of skis, snowshoes, sleighs, and sleds, many of which are also improvisations. These items are pulled by tanks, tractors, horses, reindeer, oxen, dogs, or by hand.

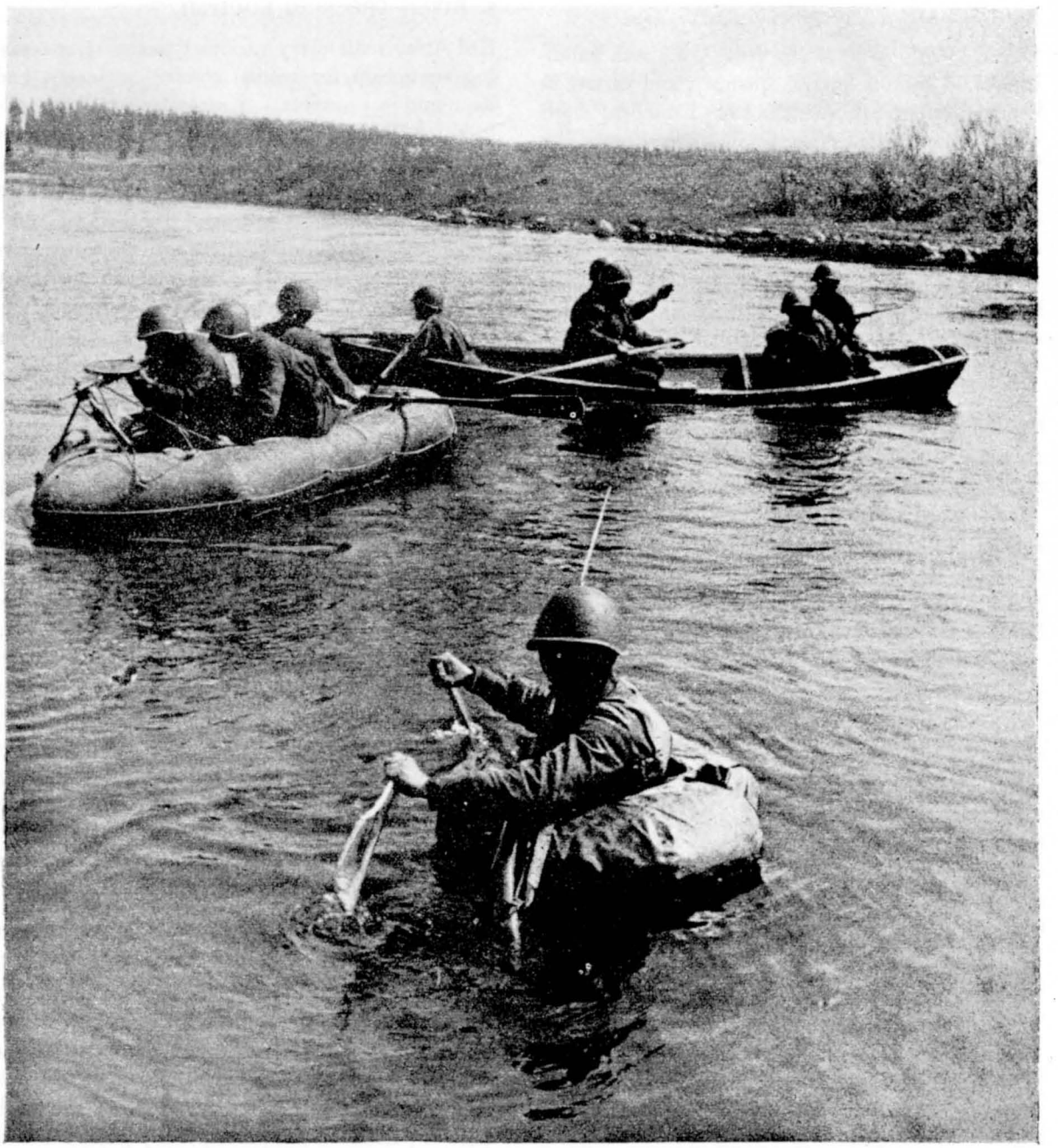

Figure 336. River crossing equipment.

Figure 337. Soviet cavalry equipment.

Figure 338. Four-wheel cavalry carts.

Figure 339. Horse-drawn rolling stove.

8. WATER BAGS

Red Army units are issued various types of open and closed rubber lister bags, with capacities ranging from 26.5 to 80 gallons, and also with 16- to 21-quart rubber water bags, which are fitted with shoulder straps and carried on a felt packboard.

9. CAVALRY EQUIPMENT

Soviet cavalry equipment (fig. 337) is of good quality, and is at least comparable in all respects to that of other armies. Sturdy, well-designed, two- and four-wheel horse-drawn vehicles (fig. 338) have been developed to meet the demand for maneuverability and flexibility in all supply lines, especially from divisional supply installations forward. Red Army vehicles are supplemented, when necessary, by requisitioned farm vehicles. Horse-drawn vehicles contribute much to the Red Army's ability to maneuver easily even under the most adverse winter and spring conditions.

Although the Red Army's cavalry equipment is outstanding, its pack horse equipment is not unusual. The Soviet Don is a fine cavalry horse, and is an important factor in the excellence of Red Army cavalry.

CHAPTER IX

EQUIPMENT

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